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Contractors' Problems.

THE recent Electrical Contractors' Conference has left a memory of many unsolved problems. Some of them are susceptible to early treatment; for some, time and persistent effort will bring a solution; but others will probably remain and fresh ones will arise. This is the normal position of any industry; they all have their periods of toiling, rejoicing, and sorrowing.

It would be hard to say which particular problem looms largest in the view of the general body of contractors—"kerbstoners" (introducing regulations and registration), specifications and conditions of contract, municipal competition, "illicit" trade discounts, or any one of several other matters. It is true to say, however, that the first of these troubles—the incompetent installer of cheap and unsafe wiring—would disappear if the other matters were settled. There's the rub! Registration or regulation is the question. There is already a system of voluntary registration which has made considerable headway, but unless the public can be properly acquainted with the aims of the National Register, which, as we have shown, means a large and sustained expenditure, it seems improbable that the voluntary method will accomplish the desired end. As for compulsory registration, this would mean legislation for which we see little hope. There does seem to be some possibility, however, of regulations, which could be shown to be as necessary as those under the Factories and Workshops Acts. The form of the regulations would, of course, be a matter for considerable discussion, but with the I.E.E. Rules as a basis for that discussion some agreed form could surely be reached between the interests concerned. Such Regulations might be considered too elaborate or stringent, but they would be binding on all, and would secure an equality of opportunity which is sadly lacking at present, when sound contractors cannot descend to the depths reached by the "jerry" wireman. One drawback to compulsory regulations is the need for inspection, but there seems to be no alternative to that whatever means is adopted to secure good installation work. Mr. C. H. FLOWER, in

his Llandudno paper, considered that only the Government could undertake this inspection, and some of his audience "trembled to think" of the results. There are certainly many difficulties and, perhaps, objections in the way of inspection by the supply authorities, but if a way could be found, these authorities could do the work far more thoroughly than Government inspectors. We might remind readers, in passing, that West Ham adopted the I.E.E. Rules as bye-laws a year or two ago.

If municipal inspection were found to be possible, it would lead to the cessation of supply authorities' wiring work, for it would obviously be unreasonable for them to inspect their own installations.

There seems to be room for a special E.C.A. Committee, as suggested by Mr. FLOWER, to discuss this very thorny problem and to find an avenue of approach to the other parties concerned in the matter.

In the meantime, taking things as we find them, it remains to be seen what immediate steps are possible. There is a widespread feeling among the supply authorities in many towns that the contractors are not doing all that they should to find outlets for the energy which the authorities generate. Many contractors agree that this is so, and have looked for the reasons. Mr. FLOWER again suggests that greater local co-operation is necessary if contractors are to provide the showrooms and service which are essential features of the electrical business to-day. He is convinced that if contractors show themselves willing and able to do their part of the work thoroughly, most supply authorities will gladly leave them unmolested and confine their attention to the cheapening of energy.

One difficulty which arises in this connection is the question of hire and hire-purchase—another essential feature of modern electricity supply. Is it possible for the supply authorities to co-operate with the contractors in this business? Or can contractors finance and run their own schemes? A short while ago the E.C.A. had under consideration the possibility of financing contractors' hire-purchase schemes, but we heard no report of progress at Llandudno, and maybe the difficulties have proved insuperable at present. Such a scheme would almost inevitably mean complete co-operation between local contractors, for it could not be effectively applied to hundreds of small units.

All the foregoing seems to confirm the need so often stressed by the contractors' leaders for more and more co-operation. Nationally the Association is strong and representative, but, generally speaking, contractors do not seem to carry the same weight locally. Only by mutual support and closer working can reputable contractors hope to secure the full trust and respect of the supply authorities and the public. This is the first step towards the solution of all contractors' difficulties, and without it nothing will be achieved.

Publicity and Electricity Supply.

WHERE electricity supply engineers meet to discuss ways and means for the advancement of electricity supply it has become the custom of late to talk of the need for publicity in the electricity supply industry. We should like to suggest, however, that when pleading for publicity in connection with the sale of electricity, and more particularly electric service, the addition of the proviso that publicity should be *of the right kind*. In many fields where "shout loud and often" has been the order the advocates have been forced to realise that the shouting can be too loud and too often.

That publicity in the supply industry, as elsewhere, is a specialist's job, and that the art of business getting in that field embodies vastly different methods from those required in more direct spheres of buying and selling, are evident from the activities in the advertising world of the North Metropolitan Electric Power Supply Co., an account of which is commenced in our "Electricity for the Home" section in this issue. Advertising in practically every possible way is practised by the "Northmet," but with care that ensures the correct note of appeal to arrest the notice of the consumer or prospective consumer without tiring him. Particular attention is given to keeping the name of the undertaking before the public in a pleasing manner, and specially prepared literature, illustrated calendars, telephone cards, and so on, are all designed to eliminate the harsh notes which are so liable to creep into so-called goodwill advertising. An outstanding example of prestige advertising is a booklet describing the historical associations of the area served by the company. This is entirely free from "electrical messages," and the name of the undertaking appears only by way of description in the title "Historical Country Served by the North Metropolitan Electric Power Supply Co."

The work of the Electrical Development Association is brought to bear on the activities of the "Northmet" in a subtle manner, and an example is cited of the E.D.A. "heavy artillery" being brought up to support the supply concern's "rifle fire" at an appropriate moment.

The Swedish Electrical Market.

THOUGH Sweden cannot be regarded as a happy hunting ground for British electrical manufacturers and traders it possesses certain features which render it more accessible than many other markets. According to Mr. Glenny, Commercial Counsellor at Stockholm, a report by whom is reviewed in this issue, the Swedes pay more attention to quality in their purchases than to price—an attitude which is very seldom found in these days. Again, the country is highly developed electrically, and although the population is a small one its electrical needs are of some magnitude. Sweden, of course, has its own efficient electrical industry with a fairly substantial export trade, but notwithstanding this she imports a considerable quantity of electrical goods from abroad. At present Germany appears to dominate this trade, but there seems to be scope for the British producer in this market which is sympathetic to Britain and not too far away.

Business can be best done through Swedish agents and in the appointment of these the Department of Overseas Trade offers its services to British firms.

South African Electrical Trade.

ALTHOUGH the Union of South Africa has not remained unscathed in the depression from which the world has been suffering for the last few years, its import statistics prove that its purchasing power has not been adversely affected. The figures which we publish in this issue show that the total value of overseas purchases of electrical plant and equipment increased by about 20 per cent. during 1929, outstanding items being electric cable and wire, which showed an advance of over 35 per cent., and wireless apparatus which more than doubled in value. Although in nearly every class imports from Great Britain predominated, our share of the trade did not advance at the same rate as the total, the increase being only 14.5 per cent., but none of our competitors showed a very substantial advance, the increase apparently being well distributed amongst them.

There were large falls in the imports of generators and engines, but against this, fairly large rises occurred in the cases of unenumerated electrical machinery and self-contained lighting sets.

The bulk of the latter class came from the United States, and this was also the case with electric hand lamps and primary and secondary batteries. Canada was ahead of this country in the supply of heating and cooking apparatus, while Holland shipped more radio apparatus, her share of this trade rising from £1,200 to £71,000. It will be seen that we supply about two-thirds of South Africa's electrical imports, but that the proportion is falling, a matter which calls for a study of the reasons with a view to arresting this movement.

A Swedish Development.

A Description of the Hydro-electric Power Plant at Hammarforsen, Sweden.

By GEORGE WILLOCK.

THE site of the present fall of Hammarforsen was originally in the middle of a large lake (Ragunda), the top level of which was 50 ft. above the present level at Hammarforsen. The lake had its outlet by means of a small stream called Gedungsen, the rapids of which formed a fall of some 100 ft. In about 1790 excavations were started to allow of a passage past these rapids, and the canal was practically finished when in 1796 a break-out occurred, which was so complete that in a few hours the level of the lake was reduced to the level at the foot of the stream. Great masses of water poured down the river, and further erosion in the lake proper took place to such an extent that the fall of Hammarforsen was created. A ledge of solid rock crossing at right angles to the flow prevented further erosion. The hydro-electric scheme was begun in 1925. The catchment area of the river at Hammarforsen was calculated to be 9,220 sq. miles, and records of levels obtained during the previous 25 years enabled reliable estimates to be made of the discharge of the river during that period. There are a number of lakes on the upper reaches of the river which are specially suited for the execution of a regulation scheme. The first lake to be regulated is Lake Törron, which has an area of some 37 sq. miles, resulting in a mean discharge of 15,000 cu. ft./sec. and a maximum flood discharge some 87,000 cu. ft./sec.

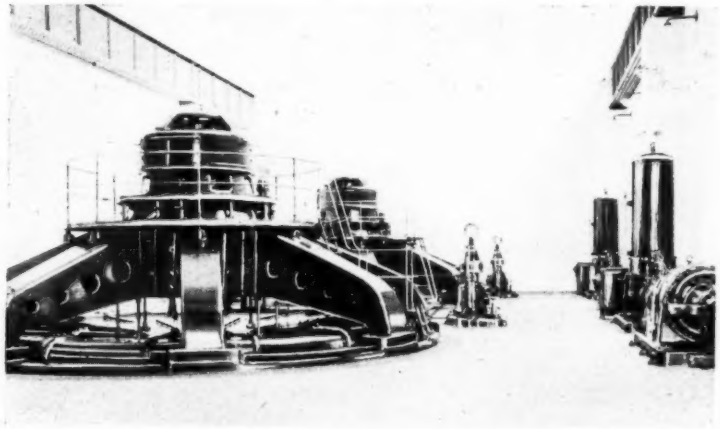


Fig. 1.—Interior of Hammarforsen Power Station.

The head and tail water levels vary considerably, by some 16 ft. and 20 ft. respectively. The total head varies from 64.5 ft. during dry periods to 44 ft. during floods. The dam holds sufficient water to meet the varying load conditions, and with it is incorporated the power station as shown in fig. 2.

The dam has an overflow length of 150 ft., two flood outlets each 96 ft. wide, and a third flood outlet 115 ft. wide. The smaller outlets are closed by means of needles resting against movable supports, and the large outlet by means of a sector-gate. The spillway is situated on the right bank of the river.

Provision is to be made for log floating, as some $1\frac{3}{4}$ million cubic metres of logs is floated every year. At present the logs pass over the sector-gate, but in the future, when the plant is extended to the full capacity of the flow, the logs will be floated through a flume $5\frac{1}{2}$ ft. deep by 29.5 ft. wide. There will then be a saving of a part of the water necessary to carry the logs over the wide sector-gate.

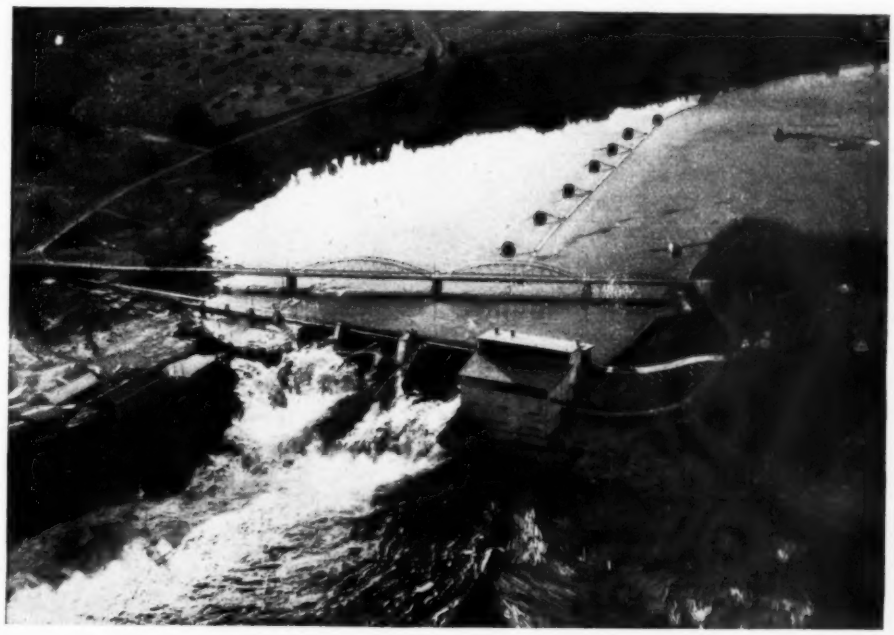


Fig. 2.—Aerial View of Hammarforsen, showing Power Station.

The first development of this plant consists of two vertical-shaft single-runner Francis turbines directly coupled to vertical-shaft generators. The turbines

are each rated at a maximum output of 15,450 b.h.p. on a net head of 64.5 ft. and a speed of 93.8 revs./min., with a maximum water consumption of 2,476 cu. ft./sec. The actual output developed was 15,600 b.h.p. with this head and water consumption, this being due to the exceptionally high efficiency obtained.

The water is conducted to the guide apparatus through a short penstock connecting the turbine scroll with the forebay. Sluice gates are provided at the intakes to the penstocks, which allow of cutting off the water supply to one or both units as desired. Each penstock is divided into two by means of a vertical wall passing down the centre of each penstock from the intake to the scroll. The sluice gates are placed in these openings, so that there are two gates to each penstock or turbine, and, further, the gates are in two parts, so that the total depth is covered by two gates, one above the other, allowing for a depth of water of some 30 ft. at the intake.

The scrolls for the turbines are so designed that the bottom is at right angles to the vertical wall and slightly curved towards the turbines, while the roof forms a sharp angle connecting the vertical wall with the upper foundation ring. At the same time care has been taken to see that the flow of water will contract evenly towards the guide vanes. Further, the spiral of the scroll is so designed that the velocity of the water is constant at all points of the circumference.

The guide apparatus is shown as assembled in the shops in fig. 4; it has 20 guide vanes of cast-steel, each supported on a bronze bearing to reduce the power required for regulation. The guide-vane spindles are cast in one with the guide vanes, and project through the stuffing boxes in the crown plate. They are connected by levers and links to a powerful operating ring of cast-steel. The links are purposely made with a small factor of safety, so that in the event of any obstruction being caught between two guide vanes the corresponding links will break and the remaining vanes will close in the ordinary way, thus preventing damage to delicate parts of the machinery. The operating ring moves on rollers.

The crown plate is of cast-iron and made in segments. It is powerfully reinforced, as it not only carries the heavy operating ring, but also the main guide bearing to the turbine shaft. The crown plate is supported by

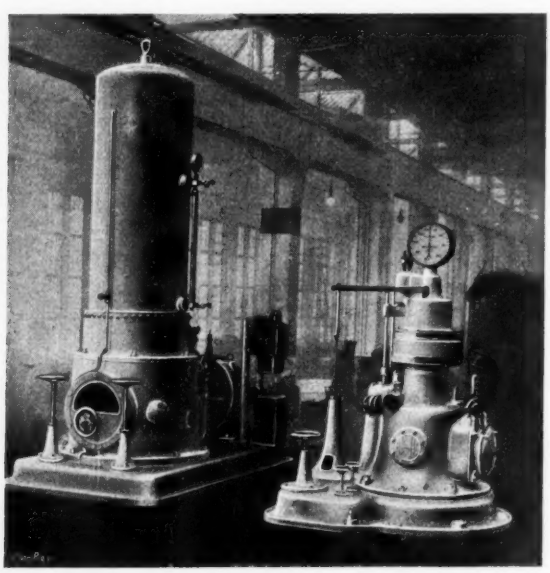


Fig. 3.—Oil-pressure Governor Equipment.

the upper foundation ring, which not only forms a connection between the scroll and the guide vanes, but also extends upwards to a considerable extent.

The runner has buckets of steel-plate cast-in in the rim and boss of cast-steel. The diameter of the runner is 13.123 ft., and it weighs 21.5 tons. The weight of the rotating parts—runner, shaft, and rotor—as well as the water pressure, is carried by a thrust-bearing placed on the top of the generator. The load may reach a total of 200 tons. The turbine shaft is of high-grade Siemens-Martin steel, 500 mm. diameter, and of the hollow type. The guide bearing is lubricated by means of a spur-gear pump driven from the main shaft.

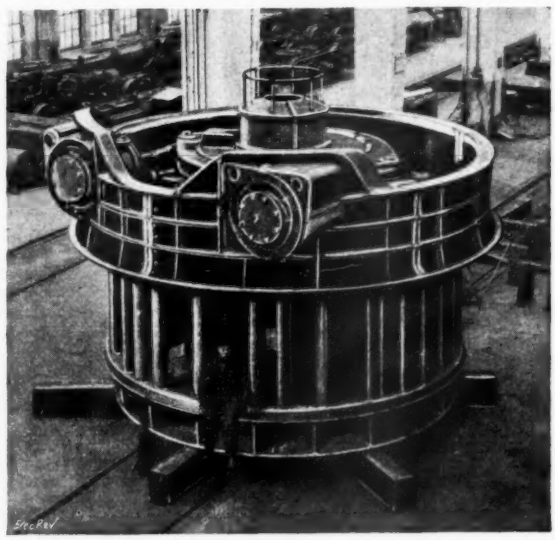


Fig. 4.—Turbine Guide Equipment.

The regulation of the guide vanes is effected by means of two servo-motors situated immediately above the turbine crown-plate on a level with the top of the operating ring. They can be clearly seen in fig. 4. These servo-motors are securely bolted to the upper foundation ring, and the piston rods are each directly connected to the operating ring by a short rod. This arrangement has the advantage that not only are the regulating forces combined within the guide apparatus and the heavy upper foundation ring, but the usual regulating shaft, with all the disadvantages of hunting, speed variation, and so on, caused by play in the bearings of the shaft, or elasticity in the shaft itself, is eliminated. Further, the appearance of the whole plant is more pleasing, as the servo-motors are under the floor out of sight.

The servo-motors are operated by oil pressure supplied by a gear pump driven by a direct-coupled electric motor. The oil pump and motor, together with the pressure-receiver, are placed on a common bedplate, fig. 3, and the whole is situated on the machine room floor, as shown in fig. 1. The oil reservoir is located in the machine-room floor immediately below the pump. The pumps and pressure receivers to both units are inter-connected, so that, if necessity should arise, one pump can supply oil to the two units.

The governor head, which is of the combined spring and weight type moving on knife-edges, is belt-driven from the turbine shaft, and is enclosed in the support containing the main valves, compensating gear, and the various hand wheels for the operation of the unit, see figs. 1 and 3. The governor is provided with remote-control electrically from the switchboard. The turbine can also be regulated by hand, and the change-over from hand regulation to automatic regulation, or *vice versa*, can take place when the turbine is running without, it is claimed, the slightest disturbance to the speed. By giving the regulating hand-wheel an extra turn the guide apparatus can be locked in the closed position.

The results of the turbine tests were considerably better than those guaranteed. The highest efficiency obtained was 93.2 per cent., which is claimed to be exceptionally high for this type of turbine.

The turbines and governors were supplied by the Nydqvist & Holm A.B., Trollhättan, Sweden.

Packing for Transport.

Materials and Requirements.

By J. W. PARKER, A.M.Inst.T.

THE cost of packing, indeed the extent to which protection is required, varies with the particular form of transport to be used. It may even happen that the question of packing decides the particular mode of conveyance, at all events for inland consignments. With the growth of large-scale road conveyance it has become possible to reduce, and in some instances even abolish altogether, the heavy packing which at one time was inevitable whenever goods were carried for anything beyond a local journey. None the less the standard of protection is still that evolved by the railways, as their practice tends to impose uniformity on other carrying agencies.

The greatest development of recent years has undoubtedly been the adoption, or substitution, of fibreboard for wood on the light apparatus and accessory side of the electrical industry. To some extent, it is true, the newer accessories have never been packed in anything else but fibreboard, because, prior to its extended use, this particular trade was not in existence; nevertheless there has been a very extensive swing over from wood to the lighter material. To avoid misunderstanding, it is as well to point out that fibreboard is a general term used to cover various materials, such for instance as cardboard, leatherboard, millboard, pasteboard, pulpboard, strawboard, and other materials of a similar character. For a long time its use was confined to the smallest packages, but, following the lead of American practice, it became possible to allow weights up to 150 lb. to be packed in each container provided the material reached a specified standard and was in other respects approved. Cases which come up to the requisite standard of the Railway Clearing House are distinguished by a certificate bearing the following words: "Certificate: This case complies with the requirements of the G.R.C. The capacity of the case is . . . lb." Containers which fail to reach the prescribed standard are not usually refused, but are carried either at their owners' risk or under the terms of the railway company's "damageable" note. Goods in approved cases must in all instances completely fill the cases, whilst articles liable to sift and leak must be packed separately and not sent loose inside the container. Brittle and fragile goods and articles in glass, such as cells, lamps, &c., are not usually carried except in smaller cases where special conditions are applicable. It should always be borne in mind that when goods are lost or pilfered from a fibre case the container concerned should be kept for examination. Failure to observe this requirement may absolve the railway company from responsibility. In addition to being waterproof and unscored, the fibreboard must possess a certain tensile strength, the actual details of which do not really concern the electrical trade so much as the manufacturers of the containers.

The chief types in use come under the description of the case-lid, one-piece, three-piece, three-piece with metal fastenings, the wood-frame end, and the all-wood end. The case-lid variety is of rigid build throughout, having a lid which wholly encloses one side and the ends, being fastened at least three ways with string. The one-piece is an economical production very like a large carton in principle, but much stronger. It is a style of case extensively used instead of parcelling, the packing and fastening being carried out with the utmost dispatch. It may be secured with cord, by glue, or by gummed strips, the last being the quickest and most effective. Having four flaps at each end, the sealed container makes up into a very strong and compact package.

Similar in construction is the three-piece, except that it possesses two lids, one at the top and the other at the bottom, secured respectively by glue, metal rivets, wire staples or stitches, and in the case of the other by gummed strip. The three-piece with metal fastenings has a body of one piece with reinforcing metal strips secured to the inner walls, the outer lengthwise edge being doubled over at an angle, hook-shaped to engage a corresponding hook-shaped strip inside the body. With the wood frame end, the corners may be either morticed and tenoned or mitred. As the bulk of stress encountered has to be taken by the ends, the wood frame gives a greatly to be desired rigidity to the whole container. In large-size cases it is, of course, impossible to secure the requisite strength by fastening folding flaps as is done with the one piece. The all-wood end is possibly not quite so flexible as the frame type, whilst its weight is somewhat greater. When this type of case is more than 9 inches deep, it must have two battens to give additional strength.

In the ordinary way, the maximum weight which may be loaded in a fibreboard container is 150 lb., the size of such a case being limited to a combined inside length, width, and depth of 75 inches. The outstanding advantage of fibreboard is the reduction in weight which in turns means a lower freight bill in all instances where the carriage is charged on the gross weight. Where a wooden case weighs 10 lb. 7 oz., an equivalent fibre case only scales 4 lb. 2 oz. The lighter case, too, is pilfer-proof, for the simple reason that it is impossible to rifle such a container and seal it up again without leaving some trace. With wooden cases, some of the contents can be taken out and the space filled up, after which the container is left in outward good order. A fibreboard case, on the other hand, must be cut open, and once this has been done it is impossible to fasten it up again satisfactorily. As many of the smaller electrical accessories run to considerable value and are easily disposable, this item is of more than passing consideration. The outside surface of fibre, too, lends itself to the printing of effective advertisement matter and designs much better than does wood, an aspect of selling which should be kept in mind with proprietary goods. Storage occupies very little room, since containers can be purchased flat and assembled quickly as required on the spot where the packing has to be done.

Not only cases, but also drums for lubricating greases, can be usefully adapted from fibreboard up to a limit of 1 cwt., provided steel lids at each end are employed, whilst ordinary goods which can be loaded in spirally-wound casks may be packed up to a maximum of 5 cwt.

Once the permissible weight limit has been passed, there is no alternative save wood in one form or another. According to the article to be packed, wooden protection may take the form of boxes, cases, or crates. The first essential is to have a soundly-designed case. Mere

thickness of timber does not constitute the best kind of protection, as by itself this feature may be nothing more or less than so much waste. A great deal can be done by the proper placing of cleats at the ends of all except the smallest boxes and cases. Two cleats fixed vertically at the ends will suffice for moderately-sized containers, but larger varieties need four, placed in the form of a square, the whole forming a framework strong enough to resist the most severe shocks.

Made-up boxes take up so much room that it is a much better plan to have all material bought in the knocked-down state so that it can be assembled at short notice by means of unskilled labour. Timber cut to the required size can be stacked very conveniently and put together as and when required with a minimum of effort. Large-headed nails of suitable gauge should be used, the cement-coated variety running about 75,000 to the cwt. being best for the purpose. Thin nails, although easily driven, do not give the required degree of security; moreover, they are prone to bend under stress, whilst their removal is not nearly so difficult as when those of thicker gauge are used. The nailing interval along the length of the case may be double that of the width, since the latter has the greater strain. Heavier goods, such as motors and goods in a finished state, are best packed in a crate. If the article is irregular or has the weight distributed unevenly, it is better to build the crate around it in the first place, as one can then determine precisely where the greatest strain lies. The art of successful crate-making lies in the construction of the corners and the fixing of the bracing pieces. In corner construction, the chief types are the box variety and the three-way corner, the latter, which has about a dozen practicable alternatives, being the strongest possible construction, inasmuch as the timber is always nailed in two directions, thereby interlocking it. A crate with a properly-designed three-way corner cannot be damaged, especially if it is steel-banded or strapped. Unusually heavy weights will require to be reinforced by angular bracing pieces running from corner to corner, and, where these diagonals cross one another, added strength is obtained if they are nailed together at these points. So far as possible, angular pieces are best fixed as close to an angle of 45 degrees as can be managed.

The chief drawback of wood in any form is that of cost, but for the heaviest consignments and exports generally, fibreboard is not as a rule acceptable, this being particularly so in the latter case, where goods must perforce be stacked in the ship's hold. In some instances fibreboard has stood up surprisingly well to Trans-atlantic journeys, and there is little doubt that in course of time its use will be extended to regular export lots. Meanwhile, a very effective substitute is being found in plywood, which, weight for weight, is very much stronger than natural timber, and far more uniform, since successive layers are fixed with the grain running at right angles; hence, the final sheet is equally strong in every direction. The tare weight is not so very much in excess of fibreboard, although the cost is somewhat higher, but this is being reduced as the virtues of the material for packing become more widely known. It is very pliable and can be turned to effective use in the protection of casks and kegs, but its greatest drawback is its liability to puncturing by contact with, say, the sharp corner of a heavy case. Another drawback to its use for bulky or long articles is found in the elasticity of the sides, which are apt to allow the contents to roll about, but this can, however, be reduced by suitable internal packing. There would appear to be little doubt that, despite these two disadvantages, a distinctly favourable future is assured for plywood as a packing material.

Whether fibreboard, natural timber, or plywood is used for protecting one's goods, there are very real benefits to be had from a policy of strict standardisation of all sizes of containers, and this is one of the surest means of securing economy. Given a little serious consideration, it is certainly not one of the most difficult to achieve.

Keying Armature Spiders.

A Note on a Method of Fitting Spiders on Slender Shafts.

By J. T. TOWLSON.

THE drawing (fig. 1) represents an armature-spider and its shaft with the spider in position. The shaft is of the " three-bearing " type, and, on account of its length, requires more careful handling than a shaft with two bearings. Not all concerns that build armatures are equipped with a modern wheel press, but, even if they are so equipped, the following remarks as regards forcing on the spider will apply.

When the spider has been fitted the shaft should *be, and remain*, true and straight. Let it be assumed that the shaft, subsequent to proper heat treatment, has been well and truly turned, the feather-way milled, and the shaft again trued, and delivered to the fitter as, fundamentally, a good job. It is then the fitter's task to fit the feather, and, let it be remembered that *fitting a feather*, especially in such a comparatively slender shaft, is by no means a job for the novice. The feather must be *fitted;* it must neither be driven tightly in, nor tumbled in and caulked round. It must be of such a fit that with a block of wood (used endwise of the grain) and a pound and a half fitters' hammer it may be driven home and screwed down.

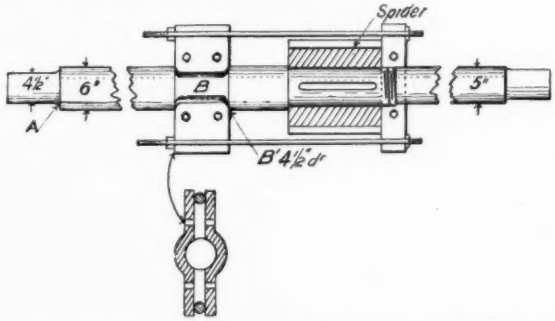


Fig. 1.—Armature Spider in Position on Shaft.

Should the key be a tight fit, especially in an endwise direction, and driven in by smart blows with a heavy hammer, the condition of the shaft, as regards remaining straight, is a serious one, for nothing is more calculated to induce a permanent camber in such a shaft than an end-tight feather.

The pressing on of the armature spider is quite a simple job for a careful man, yet full of possibilities for trouble if proper care is not exercised. The man who takes just common-sense care of such a job will deliver numbers of such elements with but a thousandth of an inch or so out of the straight, but the man who, while pressing the spider on, treats the shaft as if it were an unbendable billet will most assuredly add to the scrap pile.

To make preparations for forcing on the spider, it would be absolutely unwise to attach a set of forcing bars to the end A of the shaft, for, should the spider be a correct force fit, the shaft would then be sure to buckle at the centre bearing B.

A far better way is to go to the expense of preparing a couple of clip plates, accurately bored and radiused to fit the centre bearing, and to have these bolted together, with " through " holes for the forcing bolts. The force would then be on the shoulder B^1, and when pulling on this shoulder there would be no tendency to buckle.

The proper fitting of the feather (or feathers) and the pulling on the shoulder B^1 are the essentials of success; their neglect will ensure lasting trouble.

Talking Pictures.—III.*

The principles of recording and reproduction, with comments on the respective features and advantages of the "Vitaphone" (disk) and "Movietone" (film) systems, both recognised to be among the leading ones in use to-day.

By C. M. R. BALBI, A.M.I.E.E., A.C.G.I.

Sound-film Studio Equipment.

In the recording and reproducing of sound for talking picture work by so-called electrical methods, the process may be considered as consisting of 10 steps:—(1) The studio with its acoustical conditions; (2) the microphone; (3) the amplifier; (4) the recorder; (5) the master record; (6) copying; (7) the reproducing apparatus; (8) the amplifying apparatus; (9) the loud-speaker, and (10) the auditorium.

The first thing that strikes a person on entering a sound studio is its silence, and, if he should speak, the "flatness" of his voice would be noticeable; the second thing that makes itself felt is the studio temperature. The acoustic damping of a sound-film studio must be on most occasions of the same degree as that of a radio-telephone broadcasting studio for the correct absorption of reverberation; but, whereas the broadcasting studio requires but comparatively little illumination, the sound-film studio requires a great deal. On account of the soundproof nature of the latter studios their ventilation is poor and the heat generated by the high-tensity illumination (*) raises the temperature very quickly. The sound proofing of a film studio calls for a great deal of study, as it is very difficult to find a place that will be unaffected by noise. A "set" was recently ruined by an aeroplane passing over the studio just in the middle of the production. Elaborate precautions are taken to keep the "noise level," as understood by telephone engineers, to as low a figure as possible; indeed, silken garments should not be worn on account of the peculiar rustling effect they produce. Fig. 20 is a view from behind the scenes in a sound-film studio during the making of the talking picture entitled "Under the Greenwood Tree" by British International Pictures, Ltd., while fig. 21 shows the interior of a sound-recording booth used at that company's Elstree studios, a similar booth being visible in fig. 20 also.

Fig. 20.—A British Sound-film Studio Scene ("Set").

The actors in a sound play have to be far more perfect than in a silent film. There is no producer to shout instructions at the actors; the talkie actor has not even the comfort of a prompter, as in the case of the theatre. A set has therefore to be gone through time after time until everything is perfect. When the time comes for the real "shot" to be taken the few instructions required are given by means of differently coloured signal lamps.

A monitoring room adjoins the studio, but is isolated acoustically from it; large windows are provided through which the monitor may observe the action of the "set" and at the same time control the sound recording. In the W.E. Co.'s system the monitor man has means of properly combining the outputs of as many as nine microphones and has to control the volume of each one to get the required acoustic balance. In order to measure results qualitatively, the monitor must actually listen to the sound, and the conditions under which he listens should represent as nearly as possible average theatre acoustic conditions. For this reason the monitor's room is designed to have acoustics which might represent those of the average theatre.

Standard types of theatre loud-speakers are installed, which are operated through the monitoring amplifiers. In this way the sound may be controlled and any defects that might occur in the system can easily be detected. The sound may also be played-back either in the monitor room or in the studio to the speakers located on the stage. The main purpose of play-back is not to gauge the quality of the recording from a frequency characteristic standpoint, but to give the director and artists an opportunity of hearing the result of their efforts. If a line has been spoken incorrectly, or if there is a break in the sound which is

* For Parts I and II see ELEC. REV., June 20th and July 4th, 1930.

(*) See "Kinema Studio Illumination," ELEC. REV., March 21st, 1930, p. 565.

unnatural, or if some disturbance has been inadvertently recorded, the play-back will provide instantly such information and it is thus an important feature of a permanent recording system, not so much because of the technical aspects, but because of the economical value in time and the saving of labour.

The " Vitaphone " System.

In the " Vitaphone " system the first step in the registration of sound is carried out by means of a condenser microphone. This has an approximately uniform response characteristic from 0 to 8,000 cycles per second, giving about 3×10^{-4} volt at its terminals per bar (dynes per sq. cm.) pressure on its diaphragm. The valve amplifier associated with it consists of seven stages, the last stage containing two valves in " push-pull " and providing a voltage amplification of about 40,000. The output from this amplifier is applied to a recorder of the type shown in fig. 22, the recording machines being remote from the studio; such an installation is shown in fig. 23.

The motors are driven through an electrical synchronising device, which keeps their speed accurate within one-tenth of 1 per cent. The timing is kept within this degree of accuracy by means of a tuned valve circuit. The cutter can be seen in the illustration of the recorder (fig. 22) the response curve of which was illustrated in fig. 1. Contrary to the usual gramophone practice, the " cut " is made outwards instead of inwards, so that a film is started with the recorder on a spot on the groove nearest the spindle of the turntable. A record of 18 inches diameter has been adopted as standard. An interesting relation between playing time, radius, and minimum linear speed is given by the following formula:—

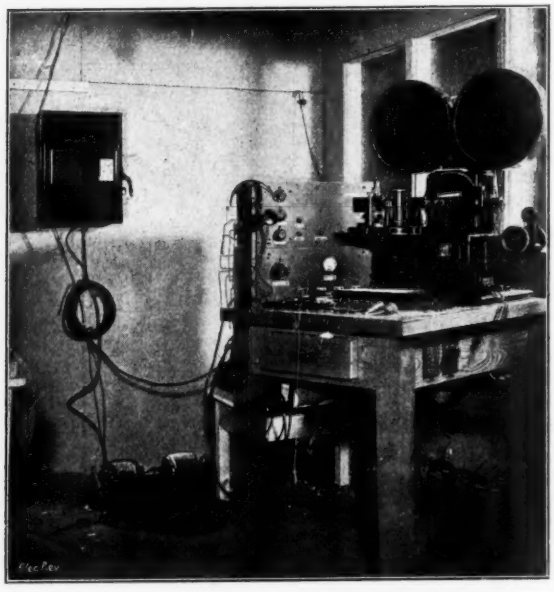


Fig. 21.—Interior of Sound-recording Booth.

Assuming $r = \frac{1}{2}R$ then $T_m = \frac{\pi N R^2}{24 V_o}$

where T_m = maximum playing time in minutes; N = number of grooves per inch; R = outside groove radius in inches; V_o = minimum linear speed in ft. per minute; and r = inside groove radius in inches. This expression is also shown in the form of a graph, see fig. 24.

Surface noise has been reduced by 50 per cent. in the last two years in the Western Electric Co.'s recording system by means of refinements in the plating process.

The reproducer pick-up used in the " Vitaphone " system is in some ways similar to that used on the acoustic gramophone, the needle holder being connected to a clamped diaphragm, which is made of highly tempered spring steel, and to it there is fastened an armature made of a special high-permeability alloy and so arranged that as the diaphragm vibrates the flux in the air-gap of a permanent magnet varies correspondingly, thereby inducing in appropriately placed coils currents which are the electrical representation of the wavy groove in which the needle travels. This reproducer is shown in fig. 25. Although the energy delivered by this instrument is comparatively small, it has a very uniform response over a wide frequency range, which result is largely brought about by moving all resonances out of the working range and by filling the magnet chamber behind the diaphragm with a heavy damping oil.

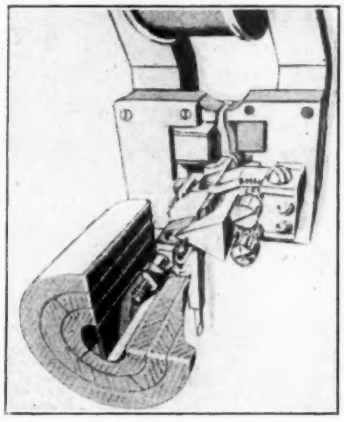


Fig. 22.—Electrical Sound Recorder.

Fig. 27 is an illustration of " Vitaphone " projectors, with the turntable and pick-up guarded by a rail.

As with ordinary motion pictures, in order to run a continuous programme it is necessary to use two projectors alternately. As the picture from one machine is faded imperceptibly into that on the other, so the sound record may be faded from one machine to the other without the audience being aware that a change has been made. At the end of each record, or sound film, the music overlaps the beginning of the next, a device called a fader being employed in making the transition. All that is necessary is to turn the fader knob when the incoming machine is started; the fader is, in fact, a double potentiometer. In the upper, or normal, operating range the change in volume in moving from one step to the next is hardly more than perceptible, whereas in the lower range used only in fading the steps are large and the volume decreases to zero on one machine and builds up on the other very rapidly. By choosing the proper step in the upper range one can obtain any volume of sound desired within reasonable limits and thereby equalise the level obtained from different sound records. The fader is ordinarily installed with one, or more, auxiliary dials and handles so interconnected that

Fig. 23.—Sound Recording Installation.

it may be operated from any projector position. In connection with the fader there is provided a switch for changing from the film to the disk input system and also

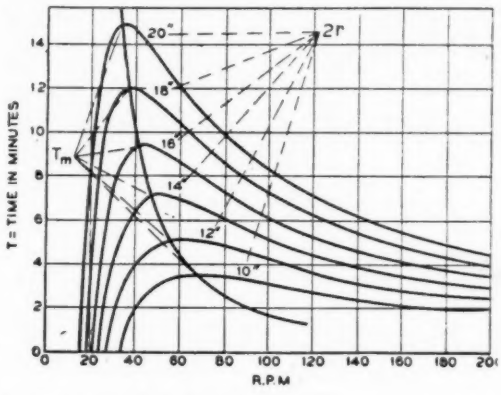


Fig. 24.—Relation between Record Playing Time, Radius, and Speed.

a key for switching a spare projector in place of either of the regular machines.

Following the fader is the main amplifier, which raises the energy of the feeble electric currents of the pick-up to a level adequate to enable the loud-speakers to provide sufficient volume to serve the particular theatre. Fig. 26 shows a typical amplifier panel, which combination is capable of an energy amplification of about 100,000,000 times and is so designed that all frequencies in the range from 40 to 10,000 cycles are amplified practically equally. A potentiometer is provided on the amplifier, but, while its handle is readily accessible, it is ordinarily not used after having once been set, at the time of installation, to give proper results in the particular theatre. Necessary adjustments are normally made on the fader.

The amplifier shown consists of three units. The first has three low-power valves in tandem, resistance coupled, requiring a 12-volt battery to deliver ¼ ampere to heat their filaments. The second is a single stage of two medium-power valves connected in push-pull arrangement with their filaments heated by low-voltage alternating current; two similar valves in this unit operate as a full-wave rectifier and supply rectified alternating current for the plate circuits of the amplifier valves of both the first and second units. The third unit has a single stage of high-power push-pull amplifier valves and push-pull rectifier valves, and also operates entirely on alternating current. The three types are capable of arrangement into combinations to meet any particular need. For small theatres only No. 1 and No. 2 are required. In the larger houses the high-power unit No. 3 is added, while to meet exceptional conditions two or more of the high-power amplifiers may be operated in parallel from the output of No. 2.

Following the amplifier there is an output control panel. It consists of an auto-transformer having a large number of taps, multiplied to a number of dial switches, to which the sound projectors, or loud-speakers, are connected. By means of this panel it is possible to match the impedance of the amplifier output to the desired number of horns, so as to make the most efficient use of the power available and also to adjust the relative volumes of the individual horns.

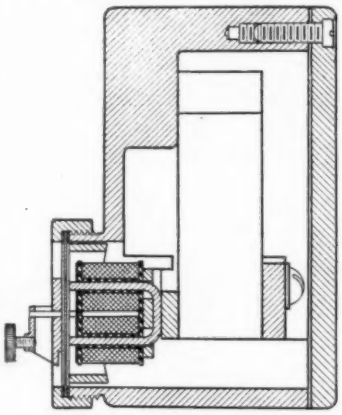


Fig. 25.—Needle Pick-up Reproducer.

The ordinary theatre installation employs a number of horns, mounted at the back of the screen and pointed in such directions as will produce a uniform level of acoustic energy throughout the theatre. The loud-speaker units employed have an extremely high efficiency; about 30 per cent. of the electrical power supplied is radiated in the form of sound. This is important, since the higher the loud-speaker efficiency the smaller is the power capacity of the amplifier needed in the system. The frequency-response characteristic of a typical speaker unit and horn is shown in fig. 28. An individual horn may be equipped with two, four, or nine units by using multiple throats. The power capacity for the continuous safe operation of the horn with one, four, and nine throats is approximately 5, 20, and 45 watts, respectively (electrical input). The number of horns used is dependent upon the particular installation and is related to the directive

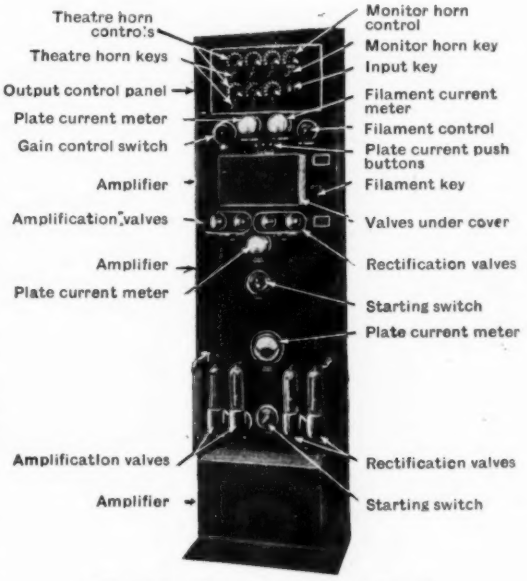


Fig. 26.—Typical Amplifier Panel.

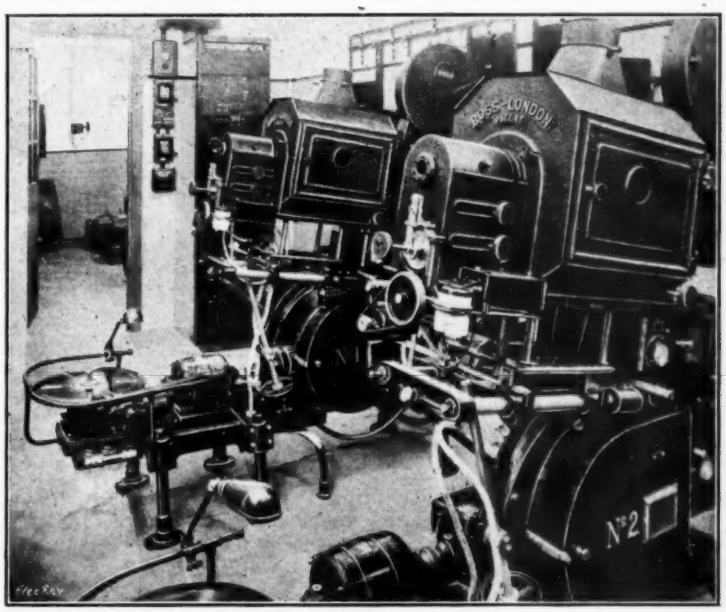


Fig. 27.—" Vitaphone " Projectors.

characteristic of the horn. If it is necessary to disperse the sound over a large angle, more horns are needed than when it is desired to concentrate it within a comparatively small angle. The directive characteristic of the horn is important in the case of talking motion pictures as it is responsible for the illusion of the sound coming directly from the mouth of the horn; that is, from the screen. If the horn is replaced by a loud-speaker of otherwise identical characteristics, but which radiates its sound over a very wide angle, there is a tendency for the sound to appear to come from a point some distance behind the screen, thus tending to destroy the illusion.

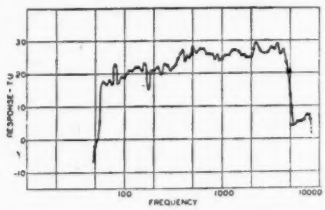


Fig. 28.—Loud-speaker Unit and Horn Frequency-response Characteristic Curve.

Under ordinary conditions the requisite power is obtained from the electricity mains in the theatre, except for the 12-volt battery required for some of the valve filaments and for the electromagnets in the loud-speakers, and the dry cells used with the photo-electric cell and its amplifier. Where 110-volt d.c. only is available there is a projector-driving equipment which operates at that voltage, but a d.c. motor driving a 60-cycle generator is required for energising the amplifiers. Where 110-volt a.c. is available, it is only necessary to connect the projector motor and the amplifiers to the mains.

Electricity for the Home.

An account of what has been, and is being done, by the North Metropolitan Electric Power Supply Company to encourage the sale of electricity for domestic purposes.

THE domestic load is of vital importance to the North Metropolitan Electric Power Supply Co., the undertaking serving an area of 660 sq. miles which is very largely residential. It will be recalled that the operations of the Company are conducted through a number of local undertakings, at present 21, each in charge of a resident engineer, who is directly responsible to the chief engineer, Capt. J. M. Donaldson, M.I.E.E., with engineering and sales assistants and a skeleton clerical staff. There were at the end of last year 58,000 consumers connected to the Company's network, an advance of 11,000 on the previous year, and at the end of 1924 the number was only 17,000.

Until last year the head office of the "Northmet" had always been in London, but a decision to bring together in one building the head office, the chief engineer's office, and the consumers' accounts office resulted in the purchase from Lord Inverforth of the present headquarters, "Northmet House," fig. 1, a seventeenth century mansion situated at the northern end of the Arnos Grove estate at New Southgate. Although the interior of the old mansion might lead one to think that it is somewhat palatial and expensive for use as an office, it was acquired at a price considerably less than it would have cost to erect a new building of equal accommodation, and a pamphlet on "Northmet House and the Organisation" has been produced to show visitors that the arrangement is not an uneconomical one. Visitors to "Northmet House" are impressed by the many old oil painted frescoes in the hall, and generally the establishment is of considerable prestige value to the undertaking. All the administrative work is centralised at the head office, while the local offices are devoted to service and business-getting. There is a floating staff of canvassers attached to headquarters, whose duty it is to assist the local resident engineers as and when required. The new system of continuous meter reading adopted by the Company has not only resulted in greatly improved office efficiency and in overcoming the bad "load factor" and the consequent confusion of the old system, but it has also brought about one very desirable thing—a steady flow of consumers to the offices and showrooms throughout the year. Last year some 250,000 accounts were rendered by the organisation, or about 1,200 per day.

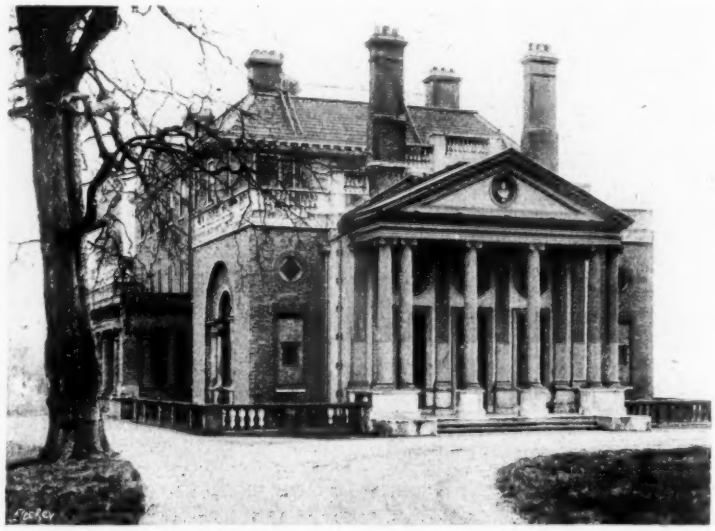


Fig. 1.—"Northmet House"; End View.

An outstanding feature of the business-getting policy of the Company is its very serious efforts to make all its transactions as simple as possible, and this is reflected in the form of application for electricity supply which has been adopted by the undertaking, and which we

M1709 5m 8-29 1701 9-28

NORTH METROPOLITAN ELECTRIC POWER SUPPLY COMPANY

N.C. C.O.T. C.O.R. EXT.

SHOWROOM AND OFFICES

POWER NORTHMET LIGHT

APPLICATION No.....

PLEASE DO NOT FOLD THIS CARD

APPLICATION FOR SUPPLY OF ELECTRICITY TO:-

Address _____ Description of Premises _____

I/We the undersigned Owner/Tenant of the above premises undertake with the Company to take a supply of Electricity at the above premises for the purpose detailed on the back hereof and agree to pay for such supply at the Company's standard rates in force from time to time in the above Undertaking.

I/We also undertake to pay a rental of 2/6 per quarter each for _____ meter and _____ demand indicator to be supplied and maintained by the Company.

I/We hereby acknowledge receipt of the Company's General Conditions of Supply and agree that such conditions shall be the basis of and form part of my/our transactions with the Company

Name of Applicant in full in block letters) _____ (Mr. *Mrs. *Miss) *Please delete words not applicable.

Usual Signature _____

Present Address _____

Occupation or Description _____ Date _____

Wiring Contractor's Name _____

Address _____

Approximate date supply is required _____ (P.T.O.

Fig. 2.—A Simple Application Form; Front.

reproduce in figs. 2 and 4. The form is a single card measuring 8 in. by 5 in.

No stone is left unturned to get every possible consumer on route of mains at the earliest possible moment, and also to get every established consumer to make use of his supply for every possible purpose. To achieve these objects "Northmet" employs the art of publicity to a very high and fine degree, and it advertises extensively both with the object of effecting direct sales and also by way of prestige publicity. Generally the undertaking does not go in for poster publicity work, because it is felt that there is not a sufficient supply of good posters available, but one poster which the Company uses stands out as a particularly excellent example and is reproduced in fig. 3. This poster, for which the Company is anxious that credit should be given to the Shropshire, Worcestershire and Staffordshre Electric Power Co., is, of course, displayed in new districts and areas just before local supplies are initiated therein.

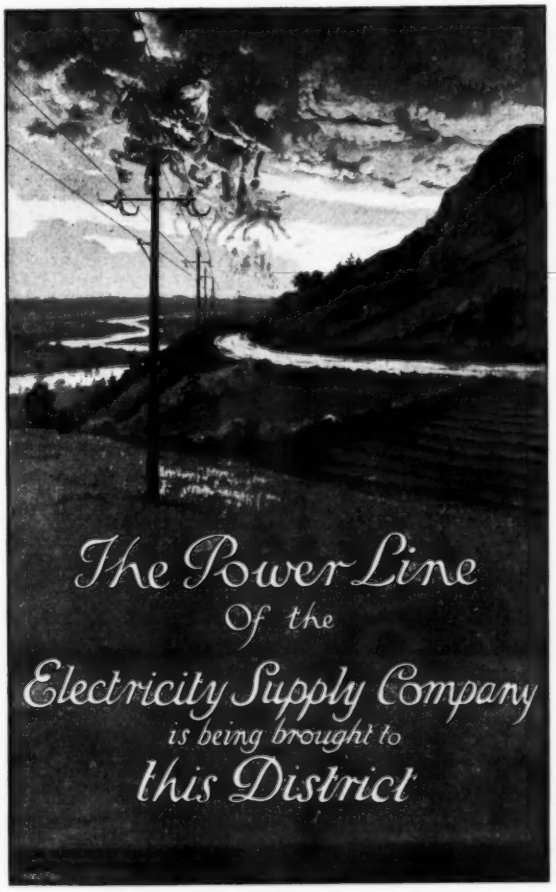


Fig. 3.—An Attractive Poster.

The chief advertising methods in use by the Company are local newspaper advertising and the distribution of booklets, pamphlets, and calendars. Newspaper advertising is regularly carried on in fourteen local papers throughout the area of supply. In the past these advertisements have been mainly addressed to the non-consumer, but last autumn it was decided that future advertisements should aim at a general extension in the use of electricity for all domestic purposes. The standard space taken for the advertisements is three columns wide by 12 in. deep, but periodically a half-page insertion is made. A recent innovation has been the insertion once monthly of a "reader" advertisement dealing with the "Northmet" service, or with the many applications of electricity in the home. Sometimes when a special cooking demonstration period is given at one of the undertaking's showrooms a whole page is taken in the local paper and devoted entirely to advertisements of electrical manufactures and of the Company. When a demonstration week was arranged at Edgware recently, sufficient applications were received from manufacturers to enable a double page of the local paper to be completely filled with electrical advertising matter.

The Company issues a large quantity of specially prepared literature, recent examples of which include "Use Electricity," a booklet issued thrice yearly and addressed both to users and non-users of electricity; a water-heating booklet, "Electricity and Ease," describing the "Northmet" convenient payment system; a cooking folder; and "Electrical Aids," a booklet explaining the uses of electricity in the home and the Company's service to consumers, giving illustrations and prices of typical electrical appliances of all kinds. These publications are distributed to "prospects," either through the post or by hand, and, in the latter case, use may be made of such an organisation as the Salvation Army. Publicity of a different nature is a booklet describing the historical associations of the area served by the Northmet Company. Such literature is circulated to selected people and serves as prestige and goodwill advertising. Use is made of the account forms as an advertising medium. On the front of the form is a poster stamp illustrating one of the uses of electricity, while the back carries an illustrated announcement concerning a particular use of electricity or of the various facilities offered by the organisation. The stamp and

PLEASE DO NOT FOLD THIS CARD **PURPOSES FOR WHICH SUPPLY IS REQUIRED.**

			Rates Available.	Rate Selected.
Lighting	Total Number of Lamps _____ Total Watts _____			
	Other Apparatus at Lighting Rates _____ Total Watts _____		(1. 2. or 3.)	_____
Heating Cooking & other Apparatus	Number of Radiators _____ Total K.W. _____			
	Cooking Apparatus _____ Total K.W. _____			
	Other Apparatus at Heating Rate _____ Total K.W. _____		(4. or 3.)	_____
Motors	Number of Motors _____ Single phase or D.C. Total H.P. _____ Three phase		(5. 6. or 7.)	_____
	Other Apparatus at Power Rate _____ Total K.W. _____		Time Switch Rental	_____

Please indicate in the space provided the rate at which you elect to be charged for each purpose
The rates of charge are detailed in the General Conditions of Supply.
No alteration to the installation may be made until the Company's consent has been obtained
The Company may demand a deposit as security for any amounts due or becoming due to the Company

Applicants should give below particulars of the most recent supply of Electricity or Gas
Address at which supply of Electricity or Gas was taken _____
Name and address of Supply Authority _____
Nature of Account with the above Authority [Monthly, Quarterly or Coin Meter] _____

Fig. 4.—Back of Application Card.

announcement are changed quarterly. With the dual object of fostering goodwill and keeping its name constantly before consumers, the Company issues each year to every consumer an attractive calendar.

Last year a special effort was made to increase the Christmas sales of electrical appliances by sending to each consumer a folder containing illustrations and prices of various electrical appliances which would make attractive Christmas gifts. By sending the folders out with the 1930 calendars, distribution costs were avoided. Considerable use is made of publications of the Electrical Development Association, and an order was recently placed for 60,000 copies of " The House You Want " for distribution to all the consumers. In recognition of the possibility which is always present of overdoing publicity, this publication was sent out directly by E.D.A. and not in the name of " Northmet," as another circular had only just before been sent out by the Company. Although a certain amount of casual advertising in local guide books, dramatic society and fête programmes, &c., is undertaken, this class of advertising is not regarded as a commercial success, and is only entered into when policy dictates such a course.

The Company has recently hired for use in its showroom windows and other places an " Electric News Panel " which spells out a series of illuminated messages concerning electricity and electrical appliances in a similar way to news signs used on several large buildings in London. Another publicity " dodge " which helps to keep the name of the undertaking before the public in an effective way is a telephone-number card.

In a large area such as that covered by the " Northmet " Company with widely varying densities of population, there must of necessity be many different scales of tariffs to cover the various distribution costs. All consumers have the choice of lighting and cooking and/or heating flat rates, sliding-scale flat rates, and all-in two-part domestic rates for lighting, heating, and cooking. The lighting flat rates vary from 4d. to 10d. per kWh, according to the district, and the heating and/or cooking flat rates from 1.2d. to 3¼d. per kWh. The sliding-scale rates vary from limits of 7d. and 1d. per kWh to 12d. and 4d. per kWh. The domestic two-part tariffs are 1½d. and ¾d. per kWh, and 1d. and ½d. per kWh, the greater charge in each case serving for the winter quarters and the smaller one for the summer quarters, with various standing charges, according to the district, based on the floor area of the premises. Perhaps the tariffs generally, and the manner in which they appeal to the consumers, can best be summarised by quoting from the address of the chairman of the Company, the Rt. Hon. Lord Ashfield, at the last annual general meeting of the company in February last. " In our endeavour to encourage the use of electricity for all domestic purposes, lighting, heating, cooking, refrigeration, &c., we have a two-part tariff which we now describe as the contract rate (previously known as the annual service rate). Last year we sold to consumers who have adopted this rate 13½ million units at an average price of 1.63d. per unit, and it is interesting to note that 6,000 consumers on this rate took last year on an average 1,897 units, compared with 328 units by consumers on the lighting and heating rates." The tariffs for each district are set out in a separate consumers' handbook, it being believed that generally consumers in one district are not interested in the charges in other districts.

There is also in vogue a special water-heating rate. The Company has found from experience that when the loading of approved types of storage heaters, thermostatically controlled, is not less than 1 kW for 10 gallons, and not more than 4 kW, the use of such an installation automatically takes supply from the mains at times when it is most convenient to the undertaking, and where these conditions are fulfilled to the Company's satisfaction, it will supply energy to consumers—who must be on the contract rate—for this purpose only at a " follow-on " rate of ½d. or ¾d. per unit (according to the district) throughout the whole year.

(To be concluded.)

Business and Industrial Notes.

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures.

" Electrical Review " Index.

The Index to Vol. CVI (for the half-year ended June 30th, 1930) is in course of preparation and will be published shortly. We shall be glad to receive the names and addresses of those who require it (free of charge) for binding purposes, or wish to retain it for reference. Application should be made as early as possible to the Publisher, 4, Ludgate Hill, E.C.4.

The British Industries Fair.

The general manager of the Birmingham Section (Mr. C. Elliott) has sent us a copy of the prospectus of next year's Fair, including a space application form. We have already given some details of the arrangements but we may repeat that the period of the Fair is from February 16th to 27th; that applications for space must be sent in by October 31st; and that there will again be a large and representative electrical section. The prospectus illustrates the three kinds of stand which are erected at Castle Bromwich; we would particularly draw attention to the " standard " stand, the floor of which measures 8 ft. by 6 ft. It is designed for the use of the smaller firms, is inexpensive, and requires little arrangement. For larger displays the open type stand, with a central office, appears to be the most suitable.

G.E.C. Overseas Re-Union Dinner.

Sir Hugo Hirst, Bt., occupied the chair at a G.E.C. Overseas Re-Union Dinner at the Savoy Hotel on June 27th, at which the guests included Sir James Donald, C.S.I., Sir Talbot Hobbs, K.C.M.G., Sir Manechji Dadabhoy, K.C.I.E., Sir Dorabji Tata, C.B.E., and Sir George Godfrey, in addition to Mr. M. J. Railing, Dr. A. H. Railing and other directors of the General Electric Co., Ltd., and business associates of the company from overseas.

In welcoming the guests Sir Hugo said that some of those present might have felt a little despondency at the economic and industrial difficulties of this country. He counselled them not to despair. Those conditions existed in other countries as well, but they did not advertise them so much as we did. Furthermore he did not know how these countries could improve themselves, whereas we had the means and the opportunity in our Empire. We should have to link up our industries at home with the industries abroad.

Sir Talbot Hobbs, replying on behalf of the guests, agreed that one of the solutions of the present economic and industrial troubles was to get to know each other better. Such difficulties would never be settled by politicians, but by business men round a conference table.

Sir Manechji Dadabhoy, who also replied, said that he was not despondent regarding the outcome of the great world struggle in which England to-day was taking part. England had always got out of its difficult positions successfully.

Sir John Hewett in a few remarks associated himself with the sentiment that the only way in which this country could possibly be run properly in the future was by close co-operation between business men of the Mother Country and the Dominions. Mr. M. J. Railing also spoke.

Unemployment.

There was a decrease of 70,001 in the number of registered unemployed during the week ended June 23rd. At that date the total was 1,815,300, as compared with 1,885,301 on June 16th, and 1,117,807 on June 24th, 1929.

New Showrooms at Maidstone.

The Maidstone Corporation Electricity Department has long felt the need for larger and more central premises for its showrooms in view of the constantly increasing number of electricity consumers, and a new building has been erected in Middle Row, a commanding position in the very heart of the town. The premises were opened on June 24th by the Mayor. Mr. E. E. Hoadley, the chief electrical engineer to the Corporation, has arranged for special demonstrations to continue for a month. The building is in the Tudor style with an attractive facade embodying supporting columns of solid teak. The whole of the interior is oak panelled and parquet floored. Ample space is provided for window displays which occupy three sides of the site, and these will be changed regularly according to season. At night, in addition to the brilliant lighting of the windows, the words "Corporation Electricity Showrooms" are blazoned in red neon lights across the three frontages. The interior comprises ground floor, first and second floors and lower ground floor. The main door leads to a large reception room, a feature of which is a brick fireplace built in the Tudor style and fitted with an electric fire. On the lower ground floor, completely equipped model domestic offices have been fitted comprising an all-electric kitchen and bathroom. The first floor is given over entirely to demonstrations of the larger appliances and to lectures, and during the opening period demonstrations were given of the "Magnet" cooker and other appliances. A "Pencemeter" is installed to disclose the actual running cost of cookers during the periods of demonstrations. Above this demonstration salon is a hall of similar size, fully equipped as a general showroom in which complete ranges of fittings and appliances are displayed. Special supply rates and hiring charges are available to meet all needs. The building of the new showrooms was carried out by Messrs. Clarke & Epps, of Maidstone, to the design of Mr. H. C. Scotto, A.R.I.B.A. The electrical installation was carried out by the Service Department under the specification and supervision of Mr. P. Fletcher, the consumers' engineer. Exterior and interior views of the showrooms appear in the accompanying illustrations.

The Maidstone Corporation Showrooms.

The Main Appliances Showroom.

"Simplex" Award at Barcelona.

As we reported at the time, SIMPLEX CONDUITS, LTD., was awarded a gold medal and certificate for its display at last year's Barcelona International Exhibition. These have now been received by the company which has sent us a picture of them. The obverse of the medal bears the portraits of the King and Queen of Spain, while the reverse is symbolical of the Exhibition. The certificate bears a view of the Exhibition and in the foreground are figures representing art and industry. The display comprised conduits and fittings, switch- and fuse-gear, unit panels, industrial reflectors and illuminated signs.

Scientific and Industrial Research.

In the "New Companies" section of this issue we record the registration of E.R.A. Patents, Ltd. This interesting announcement links up the names of directors of the C.M.A., the B.E.A.I.R.A. and four leading electrical companies. The new company's principal objects are the acquisition of patents and inventions and the promotion of scientific and industrial research.

A Holophane Overseas Conference.

On Monday and Tuesday this week the overseas agents of Holophane, Ltd., gathered in London for a technical and sales conference. A dinner was held on Monday evening at the Trocadero Restaurant, W., at which the chairman of the company, Lord Ernest Hamilton, presided. Following the loyal toast and that of "The Kings and Presidents of Our Foreign Representatives," the chairman proposed the health of the company's foreign agents. Responses were made by Mr. N. E. Unter (Egypt), Mr. C. Heybroek (Holland), and Mr. P. Korda (France). The toast of "Holophane, Ltd.," was proposed by Mr. H. Rigby (Australia), who said that instead of being bound by hard and fast conditions, Holophane agents had a "gentleman's agreement" with the company which led to harmonious relationships. Mr. Krautmacher, speaking in German, seconded the toast, to which Mr. Laurence Jones replied. Mr. Hepworth Thompson proposed the health of the guests, and replies were made by Mr. A. P. Trotter, who briefly sketched the history of prismatic lighting glassware, Professor Teichmuller (Germany) and Mr. Grey Wornum, president of the Architectural Association of Great Britain.

On the tables before each guest was a miniature flag of his nation; this made an interesting display. After dinner a cabaret show was staged to demonstrate the remarkable effects obtained from the company's colour-lighting system, and this was thoroughly appreciated by the guests.

The E.D.A.-E.L.M.A. Shop and Display Lighting Campaign.

A programme has been prepared by the E.L.M.A., and will be conducted by the E.D.A. in connection with the Shop and Display Lighting Campaign, the objects of which include the replacement of all obsolete shop-lighting equipment, the lighting of shop facias, the use of electric signs, floodlighting, and generally to stimulate public appetite for brilliant illumination. At ordinary meetings of the E.D.A. Area Committees and Campaign Conferences held during the current month, the objects and scope of the Campaign will be explained, and where a Circle does not exist it is suggested that the supply authority should convene a meeting of representatives of all sections of the electrical trade. An important feature of the campaign is a proposal that each Circle should make a survey of existing shop-lighting conditions in its area, and in this connection a survey booklet has been prepared, which has been designed to produce a record of the lighting conditions in any particular town, for the area generally, and for the whole county. In addition to the national circulation of literature to 200,000 shops and stores, the Association is inserting display advertisements in national and retail trade journals, while the local organisations are organising lectures and demonstrations, trial installations and shop-lighting competitions. Results of a recent survey show the extent of the lighting market and the necessity for organising this special campaign.

"Priorex."

We have received from VELTENE, LTD., 34, Priory Grove, S.W.8, samples of its "Priorex," a soft soap with remarkable cleansing properties. It lathers very freely and is excellent for grimy hands and many other applications.

D

Recent Contracts.

The loud-speaker installation on the Centre Court at the Wimbledon lawn tennis championships was equipped with batteries supplied by the NATIONAL ACCUMULATOR CO., LTD., which controls the sales of "Hart" and "Peto & Radford" batteries. The anode circuit was energised by 175 "PRG" type accumulators assembled in five teak boxes making a 350-V unit. For grid bias, 11.2 volt "M.P.9" batteries were used and the 12-V filament supply was obtained from two "3-HV. 23" batteries.

The Leeds City Council, on the recommendation of its Tramways Commitee, has just placed an order with the BRUSH ELECTRICAL ENGINEERING CO., LTD., for 100 double-deck, top-covered tramcars of the latest design, to be mounted on "Peckham" type flexible-axle trucks. The value of the contract is about £165,000.

The new offices for the High Commissioner for India which were opened by the King on July 8th have been equipped with a G.E.C. automatic private telephone system supplied by the RELIANCE TELEPHONE CO., LTD. . This is a 100-line exchange, and Indian woods have been used in connection with the bell boxes and the switchboard case. Special instruments have been designed for the executives, enabling them to call certain departments without the necessity of dialling.

Messrs. T. CLARKE & CO., LTD., 129, Sloane Street, S.W.1, have secured a contract comprising engines, generators, storage battery and wiring, &c., for the Imperial Bank of Persia, Tehran.

Works Visits.

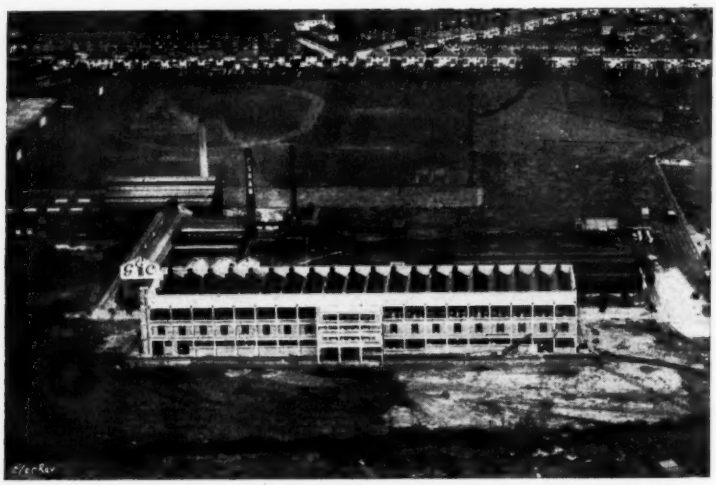
On June 30th about 40 members of the Cheltenham and West Gloucestershire E.D.A. Circles paid a visit to the Lydbrook works of Edison Swan Cables, Ltd. After touring the factory they were entertained in the spacious works dining hall, where Mr. F. Gale, the manager, expressed the company's pleasure in welcoming the visitors to its works.

Mr. G. H. Bastin, chairman of the Cheltenham Circle, and Mr. G. L. Coventon, hon. secretary of the West Gloucestershire Circle, expressed the visitors' thanks to the company, Mr. Morris responding, while the "guides" were thanked by Mr. W. J. Bache, borough electrical engineer of Cheltenham.

After travelling all night some 70 members of the Barnsley Corporation Electricity Department recently visited the Osram Lamp Works at Hammersmith. A tour of the works was made, after which the visitors remained in London till midnight, when the return journey to Barnsley was made.

A New G.E.C. Lamp Factory.

The General Electric Co., Ltd., is erecting at Wembley a new "simplified-line" factory where "Osram" pearl lamps of from 15 to 100 watts will be manufactured. The factory



The New "Osram Simplified-Line" Factory.

is being equipped with machinery of the most modern type, and the first lamp was made on July 4th. It is expected that the factory will be completed and in full operation shortly. An aerial view of the new works appears in the accompanying illustration.

Conditions in Germany.

Quoting statements from a report by the Reichs-Kredit-Gesellschaft A.G., Berlin, *The Times* states that the German industrial production index (1921=100), which had reached 109 a year ago, fell during the first half of this year to 84.6, the decline affecting all branches of industry. No change for the better occurred in the economic conditions in the leading industries as compared with the latter half of 1929, but stocks declined. At the end of May there were 1,890,000 unemployed, against 1,811,000 in May, 1929. Although the cost of living index fell, the wage index rose. The value of exports during May was 831 million Rm. as compared with 1,100 million Rm. in May last year. Further imports of foreign capital into Germany are forecast.

The New Singer Building.

Built on an imposing site in Finsbury Square, E.C.2, and looking down Moorgate Street, the Singer Building hous-

A Night View of the Singer Building.

ing the new offices and showrooms of the Singer Sewing Machine Co., Ltd., is an extremely well proportioned and dignified elevation. The site is approximately triangular and there are six floors in addition to a sub-basement, basement and ground floor. The electrical installation is particularly interesting as being a good example of modern office and showroom lighting. In the sub-basement a novel method of strong room lighting is employed. Each of the two strong rooms is lighted by nine lamps equipped with Veluria glass shades, each room being wired on a separate circuit. The general lighting in both the sub-basement and basement is carried out by Ediswan fittings with Trojan glassware accommodating 150-watt Royal Ediswan lamps. In the showrooms on the ground floor an excellent effect is obtained by the use of decorative Ediswan fittings with Ace glassware. The first four floors are devoted to office accommodation and are lighted by Ediswan pendant fittings with Ace glassware, a total of ninety of this type being employed. The lighting of the board room is provided by two special five-light fittings in carved oak and four wall-bracket fittings executed in the same style. At night time a striking spectacle is afforded by the floodlighting of that portion of the Singer building which looks down Moorgate Street. The columned section between the first and third floors is illuminated by four B.T.H. floodlight projectors, while the sixth floor coping carries thirty-seven weatherproof Mirolux trough reflectors. The small minaret on the top of the dome contains one B.T.H. floodlight projector. The effect of the floodlighting is shown in the accompanying illustration. The complete installation was carried out by Engineering Works (Electrical & General), Ltd., in collaboration with the Edison Swan Electric Co., Ltd.

Venner's New Works.

VENNER TIME SWITCHES, LTD., has sent us a view of the site of its new works on the Kingston by-pass road, where building operations are just commencing. The surroundings seem to be "truly rural."

Messrs. Avery's Bicentenary.

On July 1st Messrs. W. & T. Avery, Ltd., weighing machine manufacturers, &c., Birmingham, celebrated their 200th birthday. From an industrial point of view the event was of some significance and the occasion was marked by a large assembly of distinguished industrialists and visitors from various parts of the country and the Dominions. They were afforded an opportunity of inspecting the works associated with Watt, Boulton & Murdoch, which came into the possession of Messrs. W. T. Avery about a quarter of a century ago.

Sir J. Fortescue Flannery, the chairman of the company, presided at a luncheon; and Sir Walter Raine, president of the Association of British Chambers of Commerce, in submitting the toast "The Old Firm" touched on the early history of weighing machines and pointed out they had been brought to a degree of perfection amid surroundings famous in engineering history. In acknowledgement of the toast, Sir J. Fortescue Flannery stated that Avery's was proud of the fact that the Soho Foundry was the home of great inventions and of scientific developments which had put Great Britain in the van of progress throughout the world.

Sir Gilbert Vyle (managing director of the company) submitted the toast of "The Guests," and this was replied to by Mr. George Barnes who said it was an encouraging fact that to-day they should look upon industry and social problems not from the narrow, isolated view of class, but from the larger standpoint of the good of the whole community. Mr. Alexander Ramsey also responded to the toasts and referred to the traditions which had gathered around The Foundry; generations of men, steadfast, capable, and far-seeing, had built up that tradition instead of merely relying on it.

Lancashire Wholesalers' New Premises.

The accompanying illustration shows the premises recently opened in King Street, Blackburn, by Messrs. PALMER, RILEY

Messrs. Palmer, Riley & Co.'s New Premises.

and Co., LTD., electrical and radio factors, of Accrington. The new showroom has been equipped with many examples of lighting fittings, domestic appliances and radio equipment.

Local Exhibitions.

SALFORD.—Three stands were devoted to electrical apparatus at the Salford Industrial and Trades Exhibition (June 30th to July 5th). The General Electric Co., Ltd., had on view a wide range of electric cookers and other domestic appliances, while its associated undertaking, Salford Electrical Instruments, Ltd., exhibited a range of contactor circuit breakers, volt- and amp-meters for switchboard mounting, loading coil pots, and a set of relays for power schemes. Salford Corporation Electricity Department displayed a comprehensive range of domestic appliances, including cookers, radiators, water heaters, wash boilers, kettles, irons, &c.

WEST HARTLEPOOL.—An electrical exhibition will be held in the Borough Hall during the two weeks from October 6th to 18th.

"Mechanicals" Visit Petters Works.

About 180 members of the Institution of Mechanical Engineers paid a visit on July 2nd, to the oil-engine and aircraft works of Messrs. Petters, Ltd., Yeovil, where they were entertained by the directors and members of the staff. The party came from Bristol where they were attending the summer meeting of the Institution. In the morning the party was conducted over the engine works and in the afternoon through the aircraft works.

The visitors passed successively through the pattern shop and foundry, the power house, the heavy-machine shop, the light-machine shops, the testing beds and afterwards to the paint, packing and despatch departments. Shortly after noon the party assembled in a spacious marquee erected on the aerodrome where luncheon was laid. The President of the Institution of Mechanical Engineers, Mr. L. St. L. Pendred, proposed a vote of thanks to the hosts. Sir Ernest W. Petter, chairman of the company, and Mr. Percy Petter, vice-chairman, responded.

In the afternoon a tour of the aircraft works was made. About 2,000 workers are employed at Westland in the engine and aircraft departments.

Bankruptcy Proceedings.

H. TURNER, 20, Battersea Rise, Clapham Common, S.W., radio and electrical contractor.—The first meeting of creditors was held at 29, Russell Square, W.C.1, on June 30th. The statement of affairs submitted showed liabilities of £702 and net assets of £125, leaving a deficiency of £577. The debtor attributed his failure to falling-off of trade and insufficient profits to meet overhead charges. The case, being a summary one, was left in the hands of the Official Receiver as trustee. The following are creditors:—

	£		£
Mrs. H. Turner	195	Kolster-Brandes, Ltd. ...	103
L.E.S. Distributors, Ltd.	120	Mullard Co., Ltd.	37

G. BLACKMORE, 62, Coventry Road, Market Harborough, Leicestershire, wireless engineer.—The receiving order in this case was made on June 13th on the debtor's own petition; the first meeting of creditors was held on June 27th at the Official Receiver's office, 1, Berridge Street, Leicester. The case, being a summary one, was left in the hands of the Official Receiver as trustee. The following are the principal creditors:—

	£		£
Mrs. Blackmore	200	Edison Swan Electric Co.,	
H. M. Lonsdale	88	Ltd.	57
Radio Supply Co.	57	S. Barker	50

M. BAYNES (lately trading in partnership as Langham Radio), wireless manufacturers, 96, Regent Street, W.—An application was made on July 4th to Mr. Registrar Mellor at the London Bankruptcy Court for an order of discharge on behalf of this bankrupt who failed in October, 1929. According to the Official Receiver's report the ranking liabilities amounted to £11,436, but there were no assets. The bankrupt attributed his insolvency to a disputed liability with the petitioning creditors. The application was opposed on statutory grounds by the Official Receiver, who also alleged misconduct against the bankrupt in allowing one E. H. Newman to hold himself out as a partner and obtain credit for the business of "Langham Radio" knowing that Newman was an undischarged bankrupt. His Honour upheld the report and suspended the discharge for two years and six months.

D. J. DAVIES, 36, Cambrian Street, Aberystwyth, late of Newcastle-Emlyn, Carmarthen, wireless engineer.—The receiving order in this matter was made on May 30th last on the debtor's own petition. The first meeting of creditors was held recently, and the case being a summary one was left in the hands of the Official Receiver as trustee.

H. G. EDGHILL, 13, Wembley Hill Road, Wembley, electrical and wireless engineer.—This debtor's application for discharge was heard recently at the Court House, St. Albans. The receiving order was made in February of this year. The discharge was granted subject to a suspension for two months.

J. H. JACKSON, Dock House, Winsford.—First and final dividend of 1s. 5d. in the £, payable July 14th at the Official Receiver's office, 12, Lonsdale Street, Stoke-on-Trent.

C. R. LE BUTT, electrical engineer, 177, Regent Street, W.1.—Receiving order made June 19th on a creditor's petition. First meeting held July 9th; public examination August 19th, at Bankruptcy Buildings, Carey Street, W.C.2.

H. F. SPENCE (H. F. Spence & Sons), electrical engineer, 2, Eureka Terrace, Honiton.—Receiving order made June 26th on a creditor's petition.

T. J. HORN (Thomas Horn & Co.), electrician, 5, Harrogate Parade, Moortown, Leeds.—Receiving order made June 25th on a creditor's petition.

T. S. HANSON, electrical contractor, 26, Nether Hall Road, Doncaster.—Trustee, Mr. T. A. Stoker, 71, Albion Street, Leeds, appointed June 27th.

S. S. KELLY, electrical engineer, 59, North Road, Durham.—Trustee, Mr. H. J. Armstrong, 2, Saville Place, Newcastle-on-Tyne, released June 3rd.

Company Liquidations.

ANDIA, LTD.—Under the compulsory liquidation of this company accounts have been lodged showing liabilities of £8,959, against assets of £512, leaving a total deficiency of £33,447 with regard to contributories, the issued capital being £25,000. Mr. H. P. Naunton, Assistant Official Receiver, reported that the company was registered as a private company on April 29th, 1925, to acquire from Don Gabriel G. de Andia Yrarrazaval, known as the Marquis of Andia, the registered trade mark "Andia," for certain inventions and patent rights in relation to sound producing and amplifying apparatus, and to manufacture and deal in goods in connection therewith. The company was promoted by F. Lowenadler

and E. A. M. Welin. The Marquis granted the company a licence to make and deal in goods under his patents in all countries except France, Belgium, and North and South America, in consideration of £11,500 payable in cash. By a later agreement, dated December 16th, 1926, the company surrendered the rights with respect to Spain and Portugal, and in consideration of £11,850 the Marquis granted it the licence rights in North and South America. On July 27th, 1927, the company assigned to a new company called Artandia, Ltd., which was promoted by the Marquis, the licence rights of the patents acquired under the earlier agreement and the trade mark "Andia" with respect to Great Britain and the British Empire, and certain British registered designs. The company throughout had done very little business and the failure was attributed to lack of capital and bad management. The liquidation remains in the hands of the Senior Official Receiver.

PUNTER, BAYES & Co., LTD.—A meeting of members is called for August 5th at 31, Eastcheap, E.C.3, to receive an account of the winding up of the company by the liquidator, Mr. C. E. Punter.

BASSON ELECTRICAL Co., LTD.—Winding up voluntarily. Liquidator, Mr. F. Harrop, 10, Norfolk Street, Manchester.

C. F. YOUNG, LTD.—Winding up voluntarily. Liquidator, Mr. T. F. Birch, Court Chambers, Friar Lane, Leicester.

Dissolution of Partnership.

P. & H. ENGINEERING Co., electrical, motor and general engineers, Back Wyre Street, Padiham.—Mr. W. Parkinson and Mr. H. Hamer have dissolved partnership. Mr. W. Parkinson will attend to debts and carry on the business.

Private Arrangements.

J. D. MALLEY & C. H. MALLEY, trading as Malley & Co., electrical engineers, 114, Bedford Road, Rock Ferry, Cheshire.—At a meeting of creditors on July 2nd, a statement of affairs was submitted showing liabilities of £575 and net assets of £464, leaving a deficiency of £111. It was stated that the assets would be increased by amounts from the private estates of the partners. The business was commenced three or four years ago. At the end of last year a surplus of about £354 was shown. The turnover for the half year to June 28th last was about £600 and a loss was sustained. The meeting was adjourned for a week to enable a further statement of affairs to be prepared. In the meantime the deed of assignment already executed to Mr. John Airey, Liverpool, was confirmed. The creditors include:—

	£		£
Advance Lamp Co., Ltd.	95	Falk, Stadelmann & Co.	22
Baxendale & Co., Ltd. ...	35	Garnett, Whiteley & Co.	29
Clegg, Highcock & Co. ...	50	Protos Electric, Ltd. ...	22
Downes & Davies	122	Smith & Cookson	52

C. M. ANDERSON, trading as the Robin Hood Electrical Co., electrical contractor, &c., 1556, Stratford Road, Hall Green, Birmingham.—The receiving order herein was made on the debtor's own petition recently, and according to the statement of affairs filed there are liabilities of £544, and assets of £79, leaving a deficiency of £465. The debtor attributes his failure to bad trade due to keen competition, want of capital, damages for breach of contract, loss on a patent battery charger, &c. At the first meeting of creditors held recently, the case, being a summary one, was left in the hands of the Official Receiver as trustee.

Scheme of Arrangement.

PETO SCOTT Co., LTD.—Referring to the adjournment for one month of a petition for the compulsory winding up of this company (reported in our last issue), the Court has directed a meeting to be convened of the unsecured creditors for the purpose of considering a scheme of arrangement. The Court has appointed Mr. E. J. Offord (representing Philips Lamps, Ltd.) or failing him, Mr. J. Saunders (Mullard Wireless Service Co., Ltd.) to act as chairman.

Winding-up Petitions.

GENERAL ENGINEERING DEVELOPMENT TRUST, LTD., SURREY ENGINEERING Co., LTD., and SPHINX ELECTRIC, LTD.—Petitions for the winding up of these companies have been presented to the High Court and will be heard in London on July 14th.

New Catalogues and Lists.

ALFRED HERBERT, LTD., Coventry.—A brochure entitled "Flue Gas Purification" giving illustrated particulars of the "Modave" plant for the removal of dust and sulphur from flue gases.

MARCONIPHONE Co., LTD., 210-212, Tottenham Court Road, W.1.—An illustrated broadsheet describing a special sales "drive" based on the company's Model 55 portable radio receiver, together with the record of the monthly letters of the Sales Development Department containing useful hints for the radio dealer. Also a copy of "Radio" for July containing notes on the company's activities, and a description of the loud-speaker installation used at the recent R.A.F. Pageant.

VACUUM OIL Co., LTD., Caxton House, Westminster, S.W.1.—A well produced brochure describing the uses and applications of "Gargoyle" lubricating greases.

MULLARD WIRELESS SERVICE Co., LTD., Mullard House, Charing Cross Road, W.C.—A set of five window circles for the radio dealer with a description of these circles and the uses to which they can be put.

Messrs. WRIGHT & WEAIRE, 740, High Road, Tottenham.—An illustrated price list of "Wearite" radio components.

MORGAN CRUCIBLE Co., LTD., Battersea Works, Church Road, S.W.11.—Catalogue E.H.B.46, describing "Morganite" electric thermostats for use with "Morganite" electric radiators.

Messrs. W. H. WILLCOX & Co., LTD., 38, Southwark Street, S.E.1.—A booklet containing particulars and prices of the company's lubricating oils and pure petroleum base greases.

Messrs. FALK, STADELMANN & Co., LTD., 83 to 93, Farringdon Road, E.C.1.—A brochure describing the company's showrooms which have recently been reconstructed and extended. Some excellent illustrations of the various departments are included.

GENERAL ELECTRIC Co., LTD., Magnet House, Kingsway, W.C.2.—Catalogue No. S.5348 giving full particulars of the company's "Slick" tumbler switches. Illustrated and priced.

Messrs. G. & J. WEIR, LTD., Cathcart, Glasgow.—Publication No. 119 dealing with the company's high-pressure air compressors.

Messrs. CROMPTON PARKINSON, LTD., Guiseley, Leeds.—Three illustrated publications dealing respectively with the company's kinema converting and generating plant, truck-type switchgear, and potential indicator.

SMALL ELECTRIC MOTORS, LTD., Eagle Works, Church Fields Road, Beckenham, Kent.—Descriptive leaflet No. 22 of the company's various types of h.p. aeroplane and aerodrome generators.

CHLORIDE ELECTRICAL STORAGE Co., LTD., Clifton Junction, near Manchester.—An illustrated booklet entitled "The Charm of Sussex," describing in an entertaining manner the many historic country houses in the county in which Chloride batteries have been installed.

Trade Announcements.

Messrs. HARDMAN & Co., LTD., Rochdale, have removed their Manchester depôt to 61, Bridge Street. The telephone number is unaltered.

Messrs. BRUCE PEEBLES & Co., LTD., have taken large offices at Standard Buildings, Leeds. (Telephone: 25816.) Mr. Cecil C. Higgens, A.M.I.E.E., remains in charge of the office.

RADIO INSTRUMENTS, LTD., has appointed Messrs. J. D. Morrison & Co., of 10, Whitworth Street West, Manchester, as its representatives throughout the whole of the North of England, including the Newcastle, Yorkshire, Lancashire, and North Wales areas.

New depots have been opened by the METROPOLITAN-VICKERS ELECTRICAL Co., LTD., for the sale of "Cosmos" lamps in the Glasgow and Birmingham districts. In the case of Glasgow the company's meter business will be conducted from the same address. The new addresses are 117, West George Street, Glasgow, and International Exchange Buildings, Edmund Street, Birmingham.

The STELLA CONDUIT Co., LTD., has opened a branch, carrying a full range of conduit and conduit fittings, at 110, High Street, Southampton, under the management of Mr. E. F. Spencer.

Mr. E. J. PYNE, British representative of Messrs. Moffats, Ltd., Canada, has now vacated the office at 15, Victoria Street, S.W.1, but is retaining a storeroom there. His address is 148, Brownhill Road, Catford, S.E.6.

The business of WHITWORTH ELECTRICAL REPAIRS, LTD., 163, Seymour Place, W.1, has been transferred to the Whitworth Electric Lamp Co., Ltd., 6 and 8, Garleston Street(North End Road), West Kensington, W.14.

Messrs. A. J. TARRANT & Co., electrical engineers, are opening new premises at 4, Crown Street, Kettering.

"Conex" Connectors.

Mr. J. MARTIN BLAIR, Audrey House, Ely Place, E.C.1., informs us that a prize of £10 has been awarded to Mr. W. Laird, Shawlands, Glasgow, for his suggestion of "Conex" (in a recent competition) as the name for small conical insulating screw-on ("Ramie") connectors.

Book Notices.

"Helios," Vol. I, No. 1, July, 1930. Edited by Brig.-Gen. R. F. Legge, C.B.E., D.S.O. Price 1s.—Being the journal of the British Power & Light Corporation (1929), Ltd., and intended for circulation amongst shareholders and existing and potential consumers of the constituent companies, a separate supplement for circulation throughout the staff embraces development and construction work, results obtained, and staff news. "Helios" has a threefold object: to foster and supplement existing friendly relations with the company's consumers; to induce in the consumers and the general public a mental attitude favourable to the extended use of electricity; and to further a co-operative spirit among the staff and to introduce friendly rivalry. The company has aimed at producing a journal of general literary interest, with articles of appeal to the man in the street and the woman in the home, together with news of the latest achievements in adapting electricity to the requirements and service of householders and power consumers. The first number of the journal contains,

inter alia, the following articles: "Inherited Chaos," by Mrs. Wilfrid Ashley; "The *Raison d'Etre*," by Mr. G. V. Twiss; "Cricket," by Lord Harris; "The Development of Electricity in North Wales," by Sir Harry Haward; "Finance of the Electricity Supply Industry," by Mr. George Wansborough; and "Electricity from the Social Standpoint," by Mr. R. Nelson.

"A Study of the Induction Motor," by F. T. Chapman. Pp. xvi+289; illustrated. London: Chapman & Hall. Price 21s. net.

"A Text-Book of Sound," by A. B. Wood. Pp. xiv+519; figs. 156. London: G. Bell & Sons. Price 25s. net.

"How to Form a Company," by Herbert W. Jordan. Nineteenth edition. Pp. viii+108. London: Jordan & Sons. Price 2s. 6d. net.

"Magneto Manual," by H. R. Langman. Pp. xii+246; figs. 91. London: Crosby, Lockwood & Son. Price 7s. 6d. net.

"Die Elektrizitätsgesetzgebung," by Dr.-Ing. G. Siegel. Three volumes: (i) Germany, (ii) Western Europe; (iii) Northern and Eastern Europe. Berlin: VDI-Verlag G.m.b.H. Price Rm. 60.

We have received from Fried. Krupp Grusonwerk A-G., Magdeburg (Germany) a souvenir brochure on the occasion of the 75th anniversary of the founding of its undertaking.

"Science Abstracts (A and B)," Vol. XXXIII, June, 1930. London: E. & F. N. Spon, Ltd. Price 3s. 6d.

Prices of Materials.

The following prices are only general, and they may vary according to quantities and other circumstances:—

	CHEMICALS, &c.	Price July 8th.	Fortnight's inc. or dec.
a	Acid, Oxalic ... ... per lb.	5¾d.	...
a	Ammoniac, Sal ... ... per ton	£60	...
a	Ammonia, Muriate (large crystal) ,,	£52	...
a	Bisulphide of Carbon ... ... ,,	...	...
a	Borax ... ... ,,	£17	£8 dec.
a	Copper Sulphate ... ... ,,	£25 10s.	...
a	Potash, Chlorate ... . per lb.	3d. to 4d.	...
a	,, Perchlorate ... ... ,,	5½d.	...
a	Shellac ... ... per cwt.	£13 10s.	...
a	Sulphur, Commercial ... ... ,,	£11	...
a	,, Roll ... ... ,,	£11	...
a	Soda, Chlorate ... ... per lb.	3d.	...
a	,, Crystals ... ... per ton.	£5 to £5 5s.	...
a	Sodium Bichromate, casks ... per lb.	3¾d.	¼d. dec.
	METALS, &c.		
b	Aluminium, Ingots ... ... per ton.	£95 to £100	...
b	,, Wire ... ... per lb.	1/1 to 1/9	...
b	,, Sheet ... ... ,,	1/1 to 2/9	...
p	Babbitts Metal and Anti-friction Metals—		
	Grade I ... ... per ton net.	£130	£1 inc.
	Grade II ... ... ,, ,,	£93	...
	Grade III ... ... ,, ,,	£56	...
c	Brass (rolled metal 2" to 12" basis) per lb.	8¾d.	...
c	,, Tubes (solid drawn) ... ,,	10½d. to 11d.	...
c	,, Wire, basis ... ... ,,	9¼d.	...
c	Copper Tubes (solid drawn) ... ,,	1/0	...
g	,, Bars (best selected) ... per ton	£83	...
g	,, Sheet ... ... ,,	£83	...
g	,, Rod ... ... ,,	£83	...
d	,, (Electrolytic) Bars ... ,,	£56 16s. 3d.	£413s. 9d. dec.
d	,, ,, Sheets ... ,,	£143 10s.	...
d	,, ,, Wire Rods ,,	£66 6s. 3d.	£313s. 9d. dec.
d	,, ,, H.C. Wire per lb.	8½	...
f	Ebonite Rod ... ... ,,	2/3 to 2/6	...
f	,, Sheet ... ... ,,	2/3 to 2/6	...
n	German Silver Wire ... ... ,,	1/11	...
h	Gutta-percha, fine ... ... ,,	nom.	...
h	India-rubber, Para fine ... ... ,,	7¼d.	...
i	Iron, Pig (Cleveland No. 3.) ... per ton.	79/6	12/- inc.
l	,, Wire, galv. No. 8. P.O. qual. ,,	£20	...
g	Lead, English pig ... ... ,,	£19 10s.	...
g	Mercury ... ... per bot.	£22 12s. 6d. to £22 15s.	2s. 6d. inc.
e	Mica (in original cases) small ... per lb.	6d. to 3/-	...
e	,, ,, medium ,,	4/- to 8/-	...
e	,, ,, large ... ,,	10/- to 20/- & up	...
p	Phosphor Bronze, plain castings ,,	1/2½d.	...
p	,, ,, drawn bars & rods ,,	1/2½d.	½d. dec.
p	,, ,, rolled strip & sheet ,,	1/3d.	½d. dec.
p	,, ,, wire ... ... ,,	1/2¾d.	¾d. dec.
e	Platinum ... ... per oz.	£8 15s.	...
d	Silicium Bronze Wire ... ... per lb.	10½d.	½d. dec.
r	Steel, Magnet, in bars ... ... ,,	7¾d.	...
g	Tin, Block (English) ... ... per ton	£136 to £136 10s.	£1 15s. dec.
n	,, Wire, Nos. 1 to 16 ... ... per lb.	3/2	...

*For 1 cwt. lots. Special quotations against definite specifications.

Quotations supplied by

a	G. Boor & Co.	*g*	James & Shakespeare.
b	The British Aluminium Co., Ltd.	*h*	Edward Till & Co.
c	Thos. Bolton & Sons, Ltd.	*i*	Bolling & Lowe.
d	Frederick Smith & Co.	*l*	Richard Johnson & Nephew, Ltd.
e	F. Wiggins & Sons.	*n*	P. Ormiston & Sons.
f	India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.	*o*	Johnson, Matthey & Co., Ltd.
		p	C. Clifford & Son, Ltd.
		r	W. F. Dennis & Co.

In their letter dated July 4th, Messrs. James Forster & Co. stated that the lead market had an easy tone early last week, outside selling being in evidence, but later on renewed support by producing interests, prices were bid up to the official price level. Demand continues quiet and arrivals are expected to be only moderate but sufficient for present requirements. It is getting more and more apparent that the present price of lead is an artificial one and that sooner or later it will revert to the level justified by supply and demand.

Social Events.

As is generally the case for all G.E.C. functions, brilliantly fine weather favoured the eleventh annual amateur athletic sports of the company held on July 5th at its London sports ground, Preston Road, Wembley. This function gains in popularity with each successive year, and there was a large attendance of employés and friends to witness the 50 events of a varied programme. Each year the programme contains some novelty and this year we were treated to the spectacle of the directors hurrying from table to table, donning at each various articles of apparel, obtaining orders, lighting cigars and regaling themselves with liquid refreshment. A tendency to linger at the last table proved the undoing of many of them, and the winners, Messrs. E. Wilson, M. J. Railing and F. Winstanley, were deservedly cheered. The friendly rivalry between the various establishments of the company was very keen, both among the spectators and the competitors and the latter received plenty of vocal encouragement. A large contingent of sports officials were present and were instrumental in running the events close to the scheduled time. The side shows—always a popular feature at these functions—were well patronised. Lady Hirst was present during the greater part of the afternoon and at the conclusion of the programme distributed the prizes, after which an excellent *alfresco* concert was given by blind artistes in support of the Greater London Fund for the Blind. The successful function concluded with dancing on the green.

The first annual sports day of the Venner Time Switches, Ltd., Sports Club was held on July 5th at the company's sports ground, Plough Lane, Croydon. Excellent weather favoured the occasion and a large number of competitors entered for the 43 events. The prizes were distributed by Mrs. Graseby and Mrs. Sharp, and dancing on the green was indulged in during the afternoon and evening to music provided by amplifiers and the Venner-able Jazz Band.

The Timber Market.

Our Timber Trade Correspondent reports that the demand for house and general timbers continues brisk in London and surrounding areas, and there are yet no signs of any appreciable decrease. In the provincial areas there should be an improvement in construction work, as the official returns of building contracts show a most satisfactory increase compared with a year ago. The hardwood market is still dull. Mahogany logs are coming in very sparingly compared with the past two years, so that any fillip in the demand should have the effect of firming up values. The demand for Indian teak is steady, and prices are firm. American woods are plentiful and comparatively cheap, whilst there is a steady call for home and Colonial timbers. There are good supplies of plywood on the market, prices generally being reasonable.

Lighting and Power Notes.

Batley.—ELECTRICITY IN BULK.—The Corporation has approached Leeds Corporation Electricity Committee with proposals for securing a supply of electricity in bulk. Leeds Electricity Committee has agreed to give a supply, subject to satisfactory terms being arranged.

Bexhill.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking for the year ended March 31st last show a gross profit of £9,850, as against £12,327 for the previous year. After making provision for redemption of capital, &c., and adding bank interest and unemployment grants, the net loss for the year is £389, as against a profit of £3,028 for the previous year.

Birkenhead.—SUPPLY TO ENGINEERING WORKS.—At a recent meeting of the Corporation Electricity Committee, consideration was given to the terms suggested by the electrical engineer for a supply of electricity to Cammell, Laird & Co., Ltd. The engineer reported that the company had approved the proposals and it was decided to inform it that application is to be made for sanction to the borrowing of £10,565 for the provision of the mains, plant, and additional switch units required for the supply.

LOANS.—The Committee is seeking sanction to borrow £20,000 for mains and services in the Birkenhead area, and £5,000 for sub-station equipment.

Birmingham.—YEAR'S WORKING.—Reference to the working of the Corporation electricity undertaking for the year ended March 31st last was made in our last issue (p. 16) and we have now received a copy of the statement of accounts. The total revenue amounted to £1,852,580 and working expenditure to £1,012,066, leaving a gross profit of £840,514. The figures for the preceding year were: Income, £1,703,433; working expenses, £929,979; gross profit, £773,454. To the gross profit was added contributions from the Government Unemployment Grants Committee, bank interest, &c., making

£777,436. Capital and other charges absorbed £666,496, and there was a net surplus of £175,539, of which £31,000 was contributed to the general rate fund. The net profit for the preceding year was £168,435. The capital expenditure during the year amounted to £1,114,417, and included £235,635 for buildings, £496,569 for machinery and plant, and £382,214 for mains and services. The total now spent on the undertaking stands at £11,099,501. The sales of electrical energy increased from 314,560,336 to 357,820,996 kWh, and the average price obtained per kWh decreased from 1.3d. to 1.242d. The connections in 60-watt lamps increased from 1,160,999 to 1,270,341 and the connections in h.p. from 310,470 to 342,369.

Blackburn.—YEAR'S WORKING.—The report on the working of the Corporation electricity undertaking for the year ended March 31st last shows a total income of £210,635, as compared with £211,126 in 1928-29. The main decrease was in the revenue received from traction supply due to a reduction in the charge for electricity for this purpose, which for a complete year will be approximately £7,000. Working expenses, however, also decreased from £78,391 to £77,728, and there was therefore a slight increase in the gross profit from £132,735 to £132,907. Capital charges, &c., absorbed the whole of this, and there was a net deficit of £2,286, as compared with a surplus of £1,319 in the preceding year. The sales of electricity (excluding the supply to Preston) totalled 27,090,346 kWh, an increase of 1,717,680 kWh, but the depression in the cotton industry resulted in a decrease in the supply to Preston from 2,129,150 to 195,150 kWh.

Blackpool.—AUTUMN ILLUMINATIONS.—The Corporation has decided again to prepare an illumination scheme for the coming autumn, extending from September 20th to October 20th. Every effort is being made to improve the scheme and with this object in view it has been decided to send the electrical engineer (Mr. C. Furness) and his chief assistant (Mr. F. Field) to Antwerp to view the illuminations there.

Bradford.—CHANGE-OVER.—The Corporation Electricity Committee has decided to change over the system of supply from d.c. to a.c. in the Manningham district at an estimated cost of £12,706.

Burnley.—RECIPROCAL SUPPLY.—By the agreement which was reached between Burnley and Nelson Corporations' Electricity Departments, Burnley supplied the Nelson authority with the whole of its electricity requirements during the Nelson holidays week. This enabled extensive repairs to be carried out at the Nelson power station. At some future date the Nelson undertaking will supply Burnley. This interchange of current will enable both authorities to effect considerable economies.

Bury (Lancs.).—LOAN SANCTIONED.—The Town Council has received sanction to a loan of £27,000 for e.h.p. switchgear.

Continental.—SPAIN.—The Minister of Public Works has granted permission for the commencement of work upon the important Rio Alberche hydro-electric project. Revised construction plans, which have been officially accepted, considerably reduce the estimated cost of construction; similar economies have been determined upon in connection with other hydro-electric enterprises, including those on the Rio Toba and in the hydraulic division of the Rio Jucar, where the Villalba-de-la-Sierra plant, deriving its power from the high reaches of the same river, is already in operation. Enterprises contemplated in the south of Spain, notably in the divisions of the Rio Guadalquivir and the Rio Guadiana, will be reconsidered with a view to effecting still further construction economies. It is estimated that the new reservoirs and power stations, when completed, will provide at least 80,000 h.p. Plans have been submitted by the Compania de los Ferrocarriles Andaluces for the electrification of the Southern Spain railway system, and others for the electrification of the Bilbao-Plancia line of the Santander-Bilbao railway. Unofficial statistics show that there are in Spain 1,620 hydro-electric and 535 steam central stations, and over 270 sub-stations with a total capacity exceeding 710,000 kW hydro-electric, and 208,000 kW steam-generated power. Estimates of the total water-power available range from 2,000,000 to 10,000,000 h.p.—*Reuter's Trade Service* (Madrid).

DENMARK.—Two new 25,000-kW turbo-generators are to be installed at the municipal power station in Copenhagen.

Coventry.—WATER-SOFTENING PLANT.—Application has been made for sanction to a loan of £2,764 for a water-softening plant at the Longford generating station.

Eastbourne.—LOAN.—The Corporation Electricity Committee has obtained sanction to borrow £8,378 for extensions of the distribution system and £25,000 for mains and services.

Filey.—BULK SUPPLY.—A supply of electricity is shortly to be available from the mains of the Scarborough Corporation undertaking. The probable price will be about 7½d. per kWh. The Corporation has had trouble with farmers regarding the overhead lines, but an agreement has now been reached.

Fleet.—OVERHEAD LINE.—At a meeting of the Urban District Council on July 3rd a letter was read from the Aldershot Gas, Water and District Lighting Co., intimating that a cable, a portion of which will be underground, is to be laid from North Camp to the sub-station at Fleet, and the Council was asked for its consent to the use of an overhead line in parts of the district. The Council referred the matter to the Works Committee for consideration and report.

Heckmondwike.—HIRE-PURCHASE SCHEME.—The Urban District Council has adopted a scheme whereby consumers may purchase electric cooking equipment, including electric kettles, at cost price, the initial payment to be £1, and the balance paid by quarterly instalments over a period of five years. Main switches and fuses and wiring up to 30 ft. in length will be supplied and installed free of cost, and maintenance (repairs or renewals required due to ordinary use and wear) is to be free during the period of hire-purchase.

Leeds.—PROGRESS OF NEW POWER STATION.—Progress is being made rapidly towards the completion of the new Corporation generating station at Kirkstall, and it is possible that the turbines installed may be running on test before the end of July. It is expected that electricity will be generated at the new works well before the end of the year.

Liverpool.—LOANS.—Application is being made by the Electric Power and Lighting Committee for sanction to the borrowing of £300,000 for prospective expenditure on mains. Sanction has been obtained to the borrowing of £17,114 in respect of plant, cooling towers and foundations at the Lister Drive power station.

London.—SOUTHWARK.—The accounts of the Borough Council electricity undertaking for the year ended March 31st last show a total income of £71,556, a decrease on that of the previous year of £3,895, which is attributable to the reduction in the prices and the discontinuance of the meter rents. On the other hand the energy sold totalled 5,991,272 kWh, an increase of 446,908 kWh as compared with the previous year. The working expenses show an increase of £3,330. The gross profit was £21,104.

POWER STATION EXTENSIONS.—The London County Council Highways Committee recommends the expenditure of £450,000 on the extension and replacement of generating plant at Greenwich power station to meet the requirements of power for the running of the trams.

Portland.—INAUGURATION OF SUPPLY.—The electricity supply provided by the Urban District Council was inaugurated on July 1st. Most of the principal streets are provided with underground cables, and the scheme has cost between £15,000 and £16,000. Prospective consumers number 430, and 250 are already connected. The charges are 8d. per kWh for lighting, and 3d. per kWh for cooking, heating, and power.

Portsmouth.—YEAR'S WORKING.—The report on the working of the Corporation electricity undertaking (engineer and manager, Mr. B. Handley) for the year ended March 31st last records a total income of £274,029, as compared with £255,217 in the preceding year. Working expenses amounted to £165,419, as against £153,330, leaving a gross profit of £108,610 (£101,887), and after providing for capital charges and capital expenditure charged to revenue, there was a net surplus of £5,553, as compared with £17,605 for 1928-29. The capital expenditure during the year amounted to £148,495, the bulk of which was spent on mains and services. The electrical energy sold increased from 29,480,872 to 34,191,843 kWh, and the maximum supply demanded from 15,500 to 16,400 kW.

Rotherham.—YEAR'S WORKING.—The accounts of the Corporation electricity undertaking (engineer, Mr. E. Cross) for the year ended March 31st last, show a total revenue of £301,768 and working expenditure of £150,257, leaving a gross profit of £151,511. The figures for the preceding year were: Income, £252,976; working expenses, £119,492; gross profit, £133,484. Loan charges absorbed £110,841, and there was a net profit of £40,670, as compared with £30,322 in the preceding year. The electrical energy sold rose from 80,258,345 to 112,638,787 kWh, an increase of 40 per cent. This was largely due to a full year's operation of the bulk supply to the Sheffield Corporation undertaking, the actual energy so transferred being 23,163,000 kWh. The average price obtained per kWh fell from 0.746d. to 0.636d.

Southport.—YEAR'S WORKING.—The accounts of the Corporation Electricity Supply Department (engineer: Mr. E. Moxon) for the year ended March 31st last record an increase from £94,801 to £97,003 in the total revenue. The working expenditure was £43,881, as compared with £37,365 in the preceding year, while the gross profit amounted to £53,122 as against £57,436. To the gross profit was added an unemployment grant making a total of £53,524 available. After deducting capital and other charges there was a net surplus of £14,704, as compared with £18,535 in 1928-29, the decrease being attributable to concessions made in the charges for electricity for traction and bulk supplies and to the increase of approximately £7,000 in the rates on the undertaking. The capital expended during the year amounted to £23,714, the principal item being £15,226 for buildings, mains and services for distribution purposes. The total sales of electricity increased from 12,546,047 to 12,988,672 kWh, but the maximum supply demanded fell from 7,080 to 6,450 kW. There was an increase from £12,176 to £14,252 in the total revenue from the sale of electrical appliances but only a small demand was shown for electrical installations on assisted wiring terms.

South Yorkshire.—SPECIAL ORDER.—The Electrical Distribution of Yorkshire, Ltd., is applying to the Electricity Commissioners for a Special Order authorising it to extend its area of supply to part of the borough of Rotherham.

South Africa.—PROPOSED EXTENSIONS AT JOHANNESBURG.—The Johannesburg Tramways and Lighting Committee is recommending to the City Council extensions to the municipal power station involving an expenditure of £471,620. The additional plant proposed includes two turbo-generator sets of 15,000 kW each. Mr. A. B. Rodwell, general manager of the Electricity Department, estimates the requirements of the city in 1935 at 135 million kWh, with a maximum demand of 40,000 kW.

Sunderland.—YEAR'S WORKING.—The annual report of the Corporation electricity undertaking shows a record sale of nearly 37¼ million kWh during the year ended March 31st last. Of the total, 25.8 million kWh was for power, 6.8 millions for lighting, 2.9 millions for tramways, and 1.9 millions for public lighting. The total income was £200,034, and working expenses were £111,059. After meeting interest, mortgage, stock redemption, and other charges, there was a profit of £14,316 carried to reserve fund, which now stands at £96,365. This result has been achieved despite a general reduction of tariffs amounting in a full year to £20,000.

Wick.—ELECTRICITY SUPPLY PROGRESS.—Started only two years ago the municipal electricity undertaking has already justified itself. Since the appointment of a manager last winter the undertaking has worked to capacity, and now the power station has been enlarged to double its original size and new machinery is being installed. To obtain additional consumers the Town Council is to adopt a hired-wiring scheme. The Council is also to hold an electrical exhibition during August.

Tramway and Railway Notes.

Accrington.—PROPOSED TRAMWAY ABANDONMENT.—The Town Council has expressed itself willing to consider the abandonment of tramways along Union Road, Oswaldtwistle, on the understanding that the tramway track and rails are removed entirely under the direction of the County Council, and that the date of such abandonment be fixed by agreement.

Burnley.—YEAR'S WORKING.—We have received from Mr. Chas. H. Stafford, general manager of the Corporation Tramways and Omnibus Department, a copy of his report together with a statement of accounts for the year ended March 31st last. The total revenue from the tramway undertaking amounted to £156,624, as compared with £159,730 in the preceding year, while working expenses were £128,697, as against £128,965, leaving a gross profit of £27,927 (£30,765). From the gross profit had to be deducted £3,157 debit balance from the omnibus accounts, leaving a sum of £24,770 available for distribution. After providing for capital and other charges there was a net surplus of £1,598, as compared with £2,927 in 1928-29. The capital expenditure during the year was only £1,414. The number of passengers carried decreased from 23,942,175 to 23,545,990 and the car mileage from 2,158,794 to 2,143,953. The average total revenue per car mile was 17.53d., as compared with 17.76d. in the preceding year.

Continental.—FRANCE.—The Transport Commission recently held a meeting to discuss the electrification of the Gare de Gallardon and the reorganisation of transport services jointly with the department of Seine-et-Oise. The representatives of the department and the communes interested are to be heard on the question.—*Reuter's Trade Service* (Paris).

Darlington.—EXTENSION OF RAILLESS-CAR SERVICE.—The Corporation Electricity and Transport Committee has recommended that application be made to the Ministry of Transport for powers to extend the railless-car system along Coniscliffe Road (a distance of about one mile).

Leeds.—TRAMWAY PROFIT.—At a recent meeting of the Corporation Tramways Committee a surplus of £56,492 was reported on the tramways and transport undertaking for the year ended March 31st last.

London.—TRAMWAY EXTENSIONS POSTPONED.—The Highways Committee of the London County Council reports that it would be premature to come to a conclusion regarding the construction of new tramways until the determination of the position which has arisen respecting the Waterloo Bridge and Charing Cross Bridge schemes, and recommends the Council not to promote a Bill for the construction of new tramways in the 1930-31 session of Parliament.

Oldham.—YEAR'S WORKING.—The report of the general manager and engineer (Mr. J. F. Richards) on the working of the Corporation tramway undertaking during the year ended March 31st last shows a total income of £192,701, as compared with £207,061 in 1928-29. Working expenses amounted to £155,559, as against £168,046, leaving a gross profit of £37,142 (£39,015), to which was added revenue from other sources making a total of £42,698. After providing for capital charges and rent of leased lines there was a net surplus of £4,760. The omnibus service, however, showed a loss of £20,073, and a net deficit of £15,312 is therefore carried forward. The number of passengers carried decreased from 35,091,134 to 32,968,207 and the car miles run from 2,712,132 to 2,518,387. The total revenue per car mile rose from 18.323d. to 18.364d.

Southern Railway.—ELECTRIFICATION SYSTEM EXTENDED.—The Gravesend and Windsor extensions of the Southern Railway electrified system were formally inaugurated on Monday last. With the Wimbledon to West Croydon section, opened on Sunday, these mark the completion of a £600,000 scheme. The company now has 800 miles of electrified lines, upon which has been spent to date £12,750,000. It is the largest electric system in the world. Extensions still to be completed are those from Coulsdon to Brighton and West Worthing—48 miles—at an estimated cost of £2,700,000.

Telegraph and Telephone Notes.

China.—AUTOMATIC TELEPHONY.—The automatic telephone installation (Strowger system) in Nanking is nearing completion and the Ministry is also sending deputies to Shanghai and Hankow for the purpose of installing similar services in those two important cities. Four experts of the Ministry are to go to America to study developments in telephony. They will attend post-graduate courses at Harvard University and later enter the works of the Chicago Automatic Telephone Co. to acquire practical experience.

East Africa.—RADIO-TELEGRAPHY.—The Portuguese Marconi Company has petitioned the Minister of Colonies for the installation of a wireless central station at Beira (East Africa), thus making possible direct communication with Lisbon.—*Reuter* (Lisbon).

Empire Telegraphy.—ORGANISATION.—Submarine cable and wireless telegraphy services received attention at the sixth plenary session of the Colonial Office Conference in London last week when it was announced that Imperial & International Communications, Ltd., had submitted a comprehensive scheme for the organisation of the cable service throughout the Colonial Empire. It had not yet been considered, and before any definite decision could be reached it would have to be referred to the Colonial Governments. It was recommended that the scheme should not be considered piecemeal, but as a whole. On behalf of the Post Office it was stated that after much experience the conclusion had been reached that for long-distance services of over 2,000 miles wireless was distinctly cheaper than cables, but certainly not so efficient. With cable services a twenty-four hours per day service could be kept up, but that was not the case with short-wave wireless services.

Empire Telephony.—PROGRESS REPORT.—The Postmaster-General, in answer to a Parliamentary question, has stated that experiments are at present being conducted with a view to establishing a wireless telephone service between Australia and New Zealand. The service, it is hoped, will be linked up with the Anglo-Australian service to provide telephone communication between England and New Zealand. The establishment of a direct service with New Zealand will be considered later if the amount of traffic justifies it. Arrangements are being made to provide a direct service to Canada, in addition to the existing service *via* New York. The Union of South Africa has declared its policy to be the establishment of a Government-owned wireless station in the neighbourhood of Johannesburg instead of utilising the existing station of the South African Marconi Company, but it does not feel able to commit itself at the moment to the capital expenditure involved.

Hull.—AUTOMATIC TELEPHONY.—The telephone manager of the Hull Corporation has prepared a report on the conversion of a portion of the Hull municipal system to automatic working. It indicates that the six automatic exchanges in use would have required the services of 61 operators if they had been fitted with manual switchboards. The net saving so far has been £5,000 per annum, and the report states that there "is no doubt the scheme adopted by the Committee of serving the rapidly growing suburbs by means of branch automatic exchanges, thus saving long and costly cables from the centre of the city, and gradually converting the manual subscribers' instruments to automatic working is proving in the light of experience the best possible scheme that could have been devised."

Switzerland.—TELEPHONE PROGRESS.—As a result of the propaganda work of the society known as "Pro Telephon," formed in 1927 by the Swiss telegraph authorities in conjunction with a number of Swiss telephone apparatus manufacturing concerns, the rate of annual increase of the number of subscribers to the Swiss telephone system is reported to have been doubled.

The Telephone Service.—AUTOMATIC EXCHANGES.—In Britain there are already 330 automatic exchanges, and in two and a half years no fewer than 27 have been opened in London. The ultimate number of automatic exchanges in London, serving something like three-quarters of a million telephones, will be 150. Last year's capital expenditure on telephone development in this country was about £9,500,000.

The average time for the completion of calls (between first lifting the receiver and beginning the conversation) between two automatic exchanges is rather less than thirty seconds. If the call originates from a subscriber on a manual exchange the average time is 37 seconds.

U.S.A.—RADIO-TELEPHONY.—The American Telephone and Telegraph Company has applied to the Radio Commission for permission to erect a short-wave wireless telephone station in California in order that it may extend its transoceanic service to Hawaii and the Far East. It is hoped that the service will reach Oahu (one of the Hawaiian Islands) by 1932, says *The Times*, and in time there will be a direct service from the United States to Australia, Japan, China, and other countries. Far Eastern connections will be partly by land wires.

AUTOMATIC TELEPHONY.—More than a fifth of the twenty million telephones in the United States are now working on the automatic system. No fewer than 8,177 companies, with 19,915 exchanges, operate them; 25 companies constitute the Bell system, the remainder being independent systems and companies. Only 136 thousand telephones are so placed as to be incapable of connection with the Bell system. The rest can be called up by any subscriber in Great Britain.

Radio Notes.

Battery Eliminators.—TEST CASE.—It is rumoured that a group of radio apparatus manufacturers is contemplating taking legal action against one of the larger electricity supply authorities in connection with the compensation of listeners whose broadcast radio-telephone receiving sets are rendered useless by changes of the system of electricity distribution (from d.c. to a.c. for instance) and/or voltage of supply. The action, which will be a test case, may be avoided if negotiations which are understood to be taking place between the Electricity Commissioners, electricity supply authorities, and radio manufacturers can be brought to a satisfactory conclusion. Very few electricity supply undertakings have accepted the liability of modifying, or replacing, free of charge, radio apparatus in conformity with other domestic appliances under similar circumstances.

Empire Broadcasting.—TENTATIVE SCHEME.—The third annual report (1929) of the British Broadcasting Corporation reveals that the problems of the provision of a regular service have been considered in detail and that a full review of the position, with particulars of technical requirements, character and timing of programmes, probable response overseas, and cost, was submitted to the Government in the latter part of 1929. The Marconi Company's short-wave station at Chelmsford (G5SW) has done good work in relaying programmes for the benefit of overseas listeners, but it is admittedly experimental, though it has yielded valuable technical data that should be of utility in the establishment of a 24-hour Empire service. Whilst there is little doubt about the desirability and feasibility of such a service, it has yet to be decided who shall pay for it. The B.B.C.'s aspect of the matter was outlined by Sir John Reith at the Colonial Office Conference in London last week.

Finance.—ANNUAL REPORT.—The third annual report of the British Broadcasting Corporation for the year 1929 shows that the number of receiving licences issued at December 31st was 2,956,736, an increase of 328,344, including 15,964 issued free to blind people, an increase of 1,896. The gross income from licences amounted to £1,470,000, an increase of £163,000; of that total sum, £183,000 was retained by the Post Office, £341,949 went to H.M. Treasury, and the B.B.C. received £944,301, an increase of £72,537. The expenditure on programmes, including payment of artists, orchestras, performing rights, salaries, and expenses of the performing staff, was £548,676. Administration salaries and expenses amounted to £55,682, and governors' fees to £6,100. The capital account was increased during the year to £565,639 by the appropriation from revenue of £146,425, and there was a balance of £164,398 available for future capital expenditure on the regional scheme. The increased expenditure on programmes was £9,685, but it is pointed out that "this does not represent the true extent of programme development, as the increased expenditure involved has been largely offset by economies effected by a certain amount of centralisation." The number of SOS messages broadcast during the year was 881, some 130 more than in 1928; of the total 367 were successful, 475 unsuccessful, and in 39 cases the result was unknown.

Interference.—B.B.C. ASSESSMENT.—An assessment of the various kinds of electrical interference with radio reception, apart from tramway and trolley-'bus systems, in terms of the percentage number of letters which they represented of the total complaints received in 1929 by the B.B.C. is contained in *World Radio*. The figures are an approximation, of course, as they vary from year to year:—

Source.	Percentage.
Motors, driving machine tools, &c.	23.09
Small accumulator-charging plant	14.12
Refrigerating plant	10.01
Generating plant and underground or domestic power mains	9.5
Overhead telephone, signalling, and power lines	6.29
Kinemas	6.1
Flashing signs	4.96
High-frequency medical apparatus	1.71
Electric lifts	1.24
Large ventilating fans	0.66
Electric railways with overhead power lines	0.58
High-frequency furnace	0.09
Unidentified	21.65

The German broadcasting authorities also have made a proportionate assessment of sources and have found that high-frequency medical apparatus is the most serious source of disturbance, probably due to the fact that it is at present more generally used in Germany than it is in England.

Television.—EXPERIMENTAL TRANSMISSION.—Arranged co-operatively by the British Broadcasting Corporation and the Baird Television Co., a play is to be broadcast between 3.30 and 4 p.m. on July 14th from the company's London studio *via* the Corporation's Brookman's Park station on two wavelengths, namely, sound on 261 metres and vision on 356 metres

Contract Information.

When "Contracts Open" are advertised in our "Official Notice" pages, the date of the ELECTRICAL REVIEW containing the advertisement is given in parentheses below.

Contracts Open.

Australia.—MELBOURNE.—Posts and Telegraphs Department. August 19th. Telephone jacks. (B.X. 6477.)*

Bedford.—July 16th. Electricity Department. Oil-cooled single- and 3-phase transformers. (July 4th.)

Bridlington.—August 9th. Town Council. 11-kV switchgear for the control sub-station. (See this issue.)

Chile.—SANTIAGO.—July 29th. State Railways. Electric clocks. (B.X. 6472.)*

Crook.—July 31st. Electricity Department. Cables and sub-station. Also work in connection with overhead l.p. network. (See this issue.)

Edinburgh.—July 12th. Electricity Department. Installation of electric lighting in 312 houses. Specifications from engineer's office, Dewar Place (deposit £1 1s.). Tenders to town clerk.

Egypt.—CAIRO.—July 26th. Ministry of the Interior. Supply and erection of a cooling tower for the electric power station at Assiout. (A.X. 9627.)*

SUEZ.—August 2nd. Ministry of the Interior. Electrical plant and material for the power station. (A.X. 9822.)*

Farnworth.—July 23rd. Urban District Council. L.p. disconnecting boxes, frames and covers, and distribution pillars. (June 20th.)

Glasgow.—July 26th. Clyde Navigation Trust. One 40-ton electric travelling coaling crane and six 5-ton semi-portal electric cranes for Glasgow Harbour. Specifications from Mr. D. Fife, mechanical engineer (deposit 3 guineas). Tenders to general manager and secretary, 16, Robertson Street, Glasgow.

Grantown-on-Spey.—Town Council. July 19th. Electric lighting at three blocks of houses. Plans and specifications from H. J. Fraser, architect. Tenders to town clerk.

Hamilton.—Corporation. L.p underground cables. (See this issue.)

India.—July 16th. India Store Department. Transformers, motors and switchgear. (June 20th.)

Bombay, Baroda & Central India Railway Co. July 16th. Signalling cables. (June 27th.)

Liverpool.—July 17th. Electric Supply Department. H.p. and l.p. switchgear for sub-stations for a period of 12 months. (July 4th.)

London.—CENTRAL ELECTRICITY BOARD.—July 28th. 132-kV transmission line crossing of the River Thames for the South-East England Electricity Scheme, 1927. (June 13th.)

Foundation works for 132-V transmission line towers over the River Thames near Dagenham. (June 27th.)

August 11th. 33-kV switchgear. (See this issue.)

New Zealand.—WELLINGTON.—Public Works Department August 12th. 11-kV metal-clad switchgear and accessories for Mangahao. (B.X. 6455.)*

August 19th. Supply and delivery of three single-phase transformers for the Penrose sub-station. (B.X. 6427.)

DUNEDIN.—August 4th. Corporation Electricity Department. Three tons of cadmium copper trolley wire and four tons of hard drawn trolley wire. (A.X. 9785.)*

Omagh.—July 20th. Urban District Council. One 28-kW and one 56-kW heavy oil engine-driven alternator, l.p. switchboard, 3-ton hand-operated overhead travelling crane, underground and overhead mains. (July 4th.)

Salford.—August 2nd. Electricity Department. 33,000-V feeder between Frederick Road works and Trafford sub-station. (See this issue.)

South Africa.—JOHANNESBURG.—Railways and Harbours. July 28th. Twenty-eight electric lifts for the new railway building, Johannesburg. (A.X. 9623.)*

August 11th. Thirteen four-ton electrically-driven portal jib cranes for Table Bay Harbour. (B.X. 9683.)*

City Council. August 2nd. 3-phase truck-type switchboard panels. (A.X. 9811.)*

15 miles of copper trolley wire. (A.X. 9851.)*

Bare and weatherproof copper wire. (A.X. 9857.)*

CAPE TOWN.—July 23rd. Electricity Department. Single- and 3-phase motors and starters. (B.X. 6497.)*

DURBAN.—Railways and Harbours. One 80-ton fixed electric crane for Congella Wharf, Durban Harbour. (A.X. 9727.)

August 15th. Corporation. General Stores Department. Sixteen power transformers. (A.X. 9800.)*

Uruguay. — MONTEVIDEO. — July 31st. State Electricity Works. 84 three-phase, oil-cooled transformers. (A.X. 9768.)*

Wolverhampton.—July 14th. West Midlands Joint Electricity Authority. One 10-kVA, two 1,000-kVA, and four 25-kVA transformers, 33,000-V and 11,000-V switchgear, disconnecting boxes, services, overhead and underground mains. (June 27th.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.

Contracts Closed.

Birkenhead.—Electricity Committee. Accepted :—
Switchgear.—English Electric Co., Ltd. (£459); A. Reyrolle & Co., Ltd. (£1,065); British Thomson-Houston Co., Ltd. (£275); Ferguson Pailin, Ltd. (£78).
Transformer kiosks (£339).—Crompton Parkinson, Ltd.
Transformers (£440).—Metropolitan-Vickers Electrical Co., Ltd.

Cheltenham.—Electricity Committee. Accepted :—
Cables for 12 months.—Hackbridge Cable Co., Ltd.

Chesterfield.—Electricity Committee. Accepted :—
Feeder cable to New Square (£679).—Derby Cables, Ltd.

Eastbourne.—Electricity Committee. Recommended :—
Cable (£4,953).—Pirelli-General Cable Works, Ltd.
Electric cookers (£5,661).—General Electric Co., Ltd.

Halifax.—Electricity Committee. Accepted :—
Extension of overhead line from Hollins Warley to Littlewood Farm, Warley (£185).—Craven & District Electrical Construction Co., Ltd.

Hull.—Telephones Committee. Recommended :—
Lead covered cable (£219).—Siemens-Schuckert, Ltd.
Health Committee. Accepted :—
Electric light and bell installation at mental hospital (£645).—The J. V. Coonan Co.

Lamp Contract.—A contract for the supply of electric lamps for 12 months has been placed by the Royal Mail Steam Packet Co. with Siemens Electric Lamps & Supplies, Ltd.

Leeds.—Tramways Committee. Accepted :—
Layouts and points (£6,897).—Edgar Allen & Co., Ltd.
50 electrical equipments for tramcars (£590 per set).—General Electric Co., Ltd.
50 electrical equipments (£590 per set).—British Thomson-Houston Co., Ltd.
100 tramcar bodies (£1,428 each); 100 tramcar trucks (£235 each).—Brush Electrical Engineering Co., Ltd.
Electricity Committee. Accepted :—
Cables.—Derby Cables, Ltd. (£3,185); Croydon Cable Works, Ltd. (£1,152).
Ash-handling plant (£4,380).—Ash Co. (London), Ltd.
Libraries Committee. Accepted :—
Wiring Hunslet library (£117).—N. G. Bailey & Co.

Liverpool.—Watch Committee. Recommended :—
12 complete street fire alarm and telephone boxes and the removal of plant from Kildonan Road to Allerton station (£1,438).—Standard Telephones & Cables, Ltd.

London.—SOUTHWARK.—Electricity Committee. Recommended :—
Condenser (£575), circulating pump (£205), and air pump (£160).—H. Rue & Co., Ltd.
STEPNEY.—Electricity Committee. Ordinary meters :—

	£
MEASUREMENT, LTD. (Recommended)	4,519
Reason Manufacturing Co., Ltd.	4,621
Metropolitan-Vickers Electrical Co., Ltd.	4,825
Edison Swan Electric Co., Ltd.	6,129
Ferranti, Ltd.	6,550
Chamberlain & Hookham, Ltd.	6,550

Prepayment meters :—

MEASUREMENT, LTD. (Recommended)	3,093
Metropolitan-Vickers Electrical Co., Ltd.	3,362
Ferranti, Ltd.	3,362
Chamberlain & Hookham, Ltd.	3,368

Demand indicators (£3,902).—Reason Manufacturing Co., Ltd.
Combined meters and demand indicators (£214).—Aron Electricity Meter, Ltd.

Manchester.—Electricity Department. Accepted. Stores for twelve months ending June 30th, 1931 :—
Electric kettles.—Premier Electric Heaters, Ltd.
Current transformers.—Ferranti, Ltd.; Foster Engineering Co., Ltd.
Time switches.—Venner Time Switches, Ltd.
A.C. motors.—Asea Electric, Ltd.; British Thomson-Houston Co., Ltd.; Crompton Parkinson, Ltd.; Bull Motors, Ltd.; Lancashire Dynamo & Motor Co., Ltd.
Cables.—Connollys (Blackley), Ltd.; Johnson & Phillips, Ltd.; Macintosh Cable Co., Ltd.; Pirelli-General Cable Works, Ltd.; Power & Lighting Cables, Ltd.; Derby Cables, Ltd.; Metropolitan Electric Cable & Construction Co., Ltd.; Edison Swan Cables, Ltd.; Croydon Cable Works, Ltd.; Standard Telephones & Cables, Ltd.; W. T. Glover & Co., Ltd.; Callender's Cable and Construction Co., Ltd.; British Insulated Cables, Ltd.; Mersey Cable Works, Ltd.; Hackbridge Cable Co., Ltd.; Ward & Goldstone, Ltd.; W. T. Henley's Telegraph Works Co., Ltd.
Conduit and accessories for wiring.—Simplex Conduits, Ltd.
Service boxes, &c.—Forrest & Sym; W. & J. Lawley, Ltd.; Sykes & Dyson, Ltd.; W. Lucy & Co., Ltd.; A. and W. H. Bury, Ltd.
Service cut-outs.—Parmiter, Hope & Sugden, Ltd.; Siemens Bros. & Co., Ltd.; W. Lucy & Co., Ltd.
Transformers and balancers (auto).—Foster Engineering Co., Ltd.
Insulators.—Metro-Vick Supplies: Taylor, Tunnicliff & Co., Ltd.; J. Macintyre & Co., Ltd.; Gaskell & Grocott; Doulton & Co., Ltd.
Public Health Committee. Accepted :—
Radio-gramophone equipment and loud-speakers for Monsall Hospital.—Ferranti, Ltd.

Rotherham.—Transport Committee. Recommended :—
Overhead trolley wire (£2,583).—F. Smith & Co.
Health Committee. Recommended :—
X-ray apparatus (£951).—Solus Electrical Co., Ltd.

Rugby.—Urban Council. Accepted :—
Cable (£431).—W. T. Henley's Telegraph Works Co., Ltd.

Sleaford.—Electricity Committee. Accepted :—
Cables (£403).—Callender's Cable & Construction Co., Ltd.

Southport.—Town Council. Accepted :—
Switchboard (£18,215).—Ferguson Pailin, Ltd.

South Shields.—Electricity Committee. Accepted :—
Switchgear for group of Scott-connected transformers (£608).—Metropolitan Vickers Electrical Co., Ltd.

Stockport.—Town Council. Accepted :—
Electric motors (£420).—Veritys, Ltd.

Wakefield.—Housing Committee. Accepted :—
Electric lighting and heating at 150 houses in course of erection at Eastmoor estate (£1,222).—Walter Robb, Ltd.
Finance Committee. Accepted :—
Renewal of electric lighting and heating installation at town hall (£899).—Walter Robb, Ltd.

Worcestershire.—Education Committee. Accepted :—
Installation of electric light at Broomsgrove secondary school (£224).—Abell & Smith's Electrical Co., Ltd.

The "Electrical Review" Service Department.

INQUIRIES must be accompanied by a stamped addressed envelope.

We shall be glad to learn the names and addresses of makers of the following devices:—

"EUREKA" Boiling Rings.
"SWEEPER-VAC" Electric Vacuum Cleaner.

Notes.

Electrical Charges in Bermondsey.

At a recent meeting of the Federation of Curriers, Light Leather Tanners, and Dressers the charges for electricity in the borough of Bermondsey were discussed, and the following resolution was passed to be sent to the Electricity Commissioners:—"This meeting of industrial consumers of electricity in the Borough of Bermondsey requests the Electricity Commissioners or other competent Government body to hold an inquiry into the affairs of the electricity undertaking of the Bermondsey Borough Council with a view to ascertaining if the rates at present being charged to industrial users are justified." The following was also sent to the Bermondsey Council:—"That this meeting of users of electricity for industrial purposes protests to the Bermondsey Borough Council against the extortionate charges made by them for electricity, and request that the rates be made comparable with other supply authorities in the Metropolitan area."

B.S.S. for Carbon-filament Lamps.

The British Engineering Standards Association has just revised the British Standard Specification No. 33-1906 for carbon-filament glow lamps. This specification has been brought into line with specification No. 161 for tungsten filament lamps. The clauses in the two specifications correspond, and the lamps are now rated in lumens instead of candles.

Copies of this specification may be obtained from the British Engineering Standards Association, Publication Department, 28 ,Victoria Street, London, S.W.1, price 2s. 2d. post free.

A Swan Memorial.

A very keen and active publicity committee has been formed in Sunderland for the purpose of honouring the memory of Sir Joseph Wilson Swan. The object of the committee is to raise a national fund of not less than £5,000 to provide memorial scholarships, one of which would be allocated to the Sunderland district. The chairman of the committee is Col. J. Lynn Marr, O.B.E., T.D., and the honorary secretary is Mr. Stanley Pfob. The North-Eastern Centre of the I.E.E. has formed a Swan sub-committee (presided over by Mr. B. A. Robinson, chairman of the Centre), which is working in close association with the Sunderland committee.

Crompton Clear-speech Prize.

At Harrow School's recent prizegiving Dr. Cyril Norwood, the headmaster, announced the first award of a prize for clear speaking to Mr. J. M. Woolaston. He explained that the donor, Col R. E. B. Crompton, considered it most important that public men should be able to speak clearly into a microphone for loud-speaker reproduction. Harrow is the first school to award a prize for good articulation under such conditions.

Volcanic Steam.

In a recent issue of *L'Elettrotechnica*, Signor P. Ginori-Conti gives some details of the utilisation of the steam emitted by volcanic action midway between Pisa and Sienna in Tuscany, Italy. The steam is stated to contain from 3 to 5 per cent. of gas, mainly carbonic anhydride, and various other materials, the chief of which is boric acid. At Lardanerello generating plant, comprising two 2,500-kW turbo-generator sets, has been in operation for some years, while there is one of 750-kW capacity at Castelnuovo, and one of 650 kW at Serrazzano. The steam is delivered to the turbines in its natural state, it being treated on the exhaust side for the recovery of the boric acid. Signor Conti adds that similar experiments with the utilisation of volcanic steam are being carried out in Chili and Java.

The National Union of Students.

In increasing numbers each summer English university and college undergraduates make efforts to find paid work to occupy their long vacations. The students' difficulties in obtaining such work are at least in part due to the reluctance of employers to employ undergraduates in a way with which the last generation was not familiar, but it is felt that if more were known of the students seeking such employment, it would be found that there were many temporary posts which they could suitably occupy. An obvious benefit in employing students in this way is that if the university man, whose knowledge is primarily theoretical, could in his earlier years obtain a practical insight into the ways of industry at work he would have gone far towards equipping himself for his work of the future. In the present summer many hundreds of students are looking for vacation work as secretaries, salesmen and saleswomen, assistant engineers, and so on. The National Union of Students, 3, Endsleigh Street, London, W.C.1, is in a position to introduce suitable students to any employer who will apply to the secretary.

Educational.

ROYAL TECHNICAL COLLEGE, GLASGOW, DEPARTMENTS OF ENGINEERING.—In our advertisement pages to-day particulars appear of the engineering courses available with details of fees, heads of departments, &c.

A Hydro-electric Auxiliary Station.

The hydro-electric power storage station which has recently been completed at Niederwartha, near Dresden, Saxony, not only serves to cover the peak-load demands, but also acts as an instantaneous stand-by which can take up its duties the moment one of the steam super-power stations at Bohlen or Hirschfelde, which provide Dresden with electrical energy, fails for any reason. The storage water is taken from the River Elbe and delivered to the lower storage reservoir of 70,600,000 cu. ft. capacity by means of a small low-pressure pumping plant. From this reservoir the water is pumped to an upper storage basin 470 ft. above the level of the lower reservoir. For the time being, two 6,000-ft. pipe lines are provided, and as the upper part of the lines has only a slight incline, two surge chambers are installed about midway. The first equipment of the Niederwartha power station comprises four pump-turbine units, each of a capacity of 30,000 h.p., the major portion of which was supplied by Escher Wyss and Co. The final equipment will embody eight such units with a total capacity of 120,000 kW. The pumps are designed for an output of 2,335 gal. per sec. under a head of 490 ft. The impeller consists of a main stage and two additional wheels mounted on one common shaft, and is calculated for a maximum output of 2,665 gal. per sec. The two additional wheels act as feeders for the main stage and overcome only a fraction of the total head, an arrangement which diminishes the risk of cavitation; the high-pressure stage at the same time is safeguarded as the water is supplied to it under pressure. The machine sets each consist of a centrifugal pump with rotary guide blades of the Escher Wyss pattern, a motor-generator and a turbine all mounted on one common horizontal shaft. During the daily replenishing of the upper storage reservoir the motor generators drive the pumps by excess energy, mostly night current, supplied by the steam power stations. During the period of maximum current consumption in the municipal network, the stored water is supplied to the turbines, which then drive the motor-generators, the latter furnishing the peak load current, whilst the pumps are disconnected.

The Electrical Association for Women.

On July 3rd nearly 100 members of the Association visited the works of Electrolux, Ltd., in Luton. Refrigerators of all sizes, designed for different sizes of homes, were inspected, and an insight was obtained into the rigorous tests to which all apparatus is subjected. Of interest also to the members was the company's sports club, which is run entirely by an elected committee of the workpeople.

The party was received by Messrs. A. H. Hunter and A. Clarke on behalf of Mr. Scrivener and the company.

At the invitation of its chairman, Mrs. H. S. Ellis, the Mid-Gloucestershire branch of the Association on June 28th attended a garden fete at the Grange, near Newnham. The proceedings were opened by the Countess of Berkeley, who made a presentation to Miss G. Johnson (hon. secretary) in recognition of her work for the Association. A tennis tournament and other entertainments proved most enjoyable. The area covered by the Mid-Gloucestershire branch lies between Hereford on the north and Stroud on the south.

Mines Department Test of Bells and Relays.

The Secretary for Mines announces the issue of a revised memorandum on the subject of the Mines Department test of direct-current electric bells and relays designed for signalling in coal mines. The conditions laid down in the memorandum, which supersedes that issued in February, 1924, will govern such tests undertaken in future. The principal alterations in the memorandum are contained in paragraphs 2 and 5, which set out the nature and requirements of (1) the tests for intrinsic safety of instruments intended for use singly or with two or more in parallel, and (2) the tests applied to a flame-proof enclosure when it is a necessary condition of safety, or where it is desired that the enclosure shall be certified to be flame-proof. Some variations have also been made with regard to the procedure to be followed when forwarding instruments for test. Copies of the memorandum may be obtained on application to the Mines Department, Dean Stanley Street, London, S.W.1.

Appointments Vacant.

Chief clerk for Wallasey Electricity Department.
Deputy electrical engineer for Coventry Corporation.
Working electrician for Uttoxeter Electricity Department.
(See our advertisement pages to-day.)

City & Guilds (Engineering) College.

The report of the Dean of the College on the educational work during the 1929 session contained in the "Report of the Council" of the City and Guilds of London Institute shows that the College was attended during the session by 495 students, as compared with 482 students in 1927-28 and 506 in 1926-27. Sixty-six students entered for the final (internal) B.Sc.(Eng.) degree examination of the University of London, 54 of whom passed, 12 with first-class honours and 24 with second-class honours. The expenditure on maintenance during the financial year 1928-29 was £59,595, against which £24,683 was received in students' fees and £4,000, £1,449 and £88, respectively, from the Clothworkers' Company, the Goldsmiths' Extension and the Hawksley Endowment Funds. For the year 1929-30 a budget of £62,826 has been approved by the governing body of the Institute.

A Local Lighting Installation.

With the introduction in banks and other large business establishments of mechanised accounting and book-keeping methods which call for the use of a large variety of different types of office machines, it became necessary to design some special system of illumination to be used with them, the most usual form of office lighting by means of overhead units having been found unsuitable for lighting machines of this description. The "Typerlite" Company has specialised in designing a variety of adjustable units fitted with special attachments for use with book-keeping, accounting, calculating, addressing and similar machines, which enable each operator so to adjust the light on to the required part of the machine as to work it to the best advantage. The accompanying illustration shows a section of a large bank installation of this description, in which the "Typerlites" are made up

"Typerlites" in a Banking Establishment.

one-piece fittings with adjustable heads, and are connected direct on to the conduit of the lighting installation. The fittings, which are all finished in Florentine bronze, are fitted with special "Typerlite" shades with internal pigmentation to correct the light. They are not only installed for lighting accounting machines, but also for use with filing cabinets, typewriters, and as ordinary bank standards. Many of the large banks, &c., are now using these fittings.

The adaptability of these fittings makes them specially suitable for any purpose for which a lighting unit is required that enables each individual user so to adjust the direction of the illumination in a way best suited for their special work.

Electrified Farms in the U.S.A.

During the year 1929 the total number of electrified farms in the United States increased from 460,000 to 558,000, or by 21.5 per cent. This, according to the *Electrical World*, is the largest annual increase so far recorded. At the end of 1923 there were only 166,140 farms receiving electric service. Since that time the total number has been increasing at a rate which doubles every 3½ years. California leads in the number of farms supplied with service by the light and power companies, with a total of 72,690 at the end of 1929, representing an electrification of 53 per cent. New York comes next with 53,060, Ohio third with 38,045, and Washington fourth with 37,813. Montana heads the list for the greatest percentage increase during the past year. On December 31st, 1928, the State had only 890 electrified farms, which number increased during the year to 1,844, or by 107.2 per cent. Arizona comes next with a percentage increase of 93.1 per cent., and New Hampshire third with 79.1 per cent.

Aircraft Apprentices.

Five hundred aircraft apprentices, between the ages of 15 and 17, are required by the Royal Air Force for entry into the schools of technical training at Halton, Bucks., and at Cranwell, near Sleaford, Lincs. They will be enlisted as the result of open and limited competitions to be held in the near future by the Civil Service Commissioners and the Air Ministry, respectively. Full information can be obtained upon application to the Royal Air Force (Aircraft Apprentices' Department), Gwydyr House, Whitehall, London, S.W.1. The scheme offers a good opportunity to well-educated boys of obtaining a three-years' apprentice course of a high standard and of following an interesting technical career. The principal trades open to boys include those of wireless operator-mechanic and electrician; thorough training is given by qualified technical instructors and general education is also carried on simultaneously by a staff of graduate teachers. Subsequently there is the prospect of promotion, and apprentices of special promise proceed to the Royal Air Force College (all their fees thereat being remitted) for training to become commissioned officers.

A New Cable for Electric Signs.

A new cable, designed to meet the requirements of neon signs, has been brought out by the General Electric Co., of America. On test this cable is reported to have withstood 30,000 volts for 120 hours, and it has also been proved capable of withstanding 50,000 volts for one minute. The permissible moisture absorption for neon sign cable is 10 per cent. when a sample of the cable has been immersed in water for twenty-four hours. A sample of this cable was moisture immersed for twenty-four hours, and was found to have absorbed only 0.56 per cent. by weight. This new cable is suitable where a small diameter, high voltage corona-proof conductor is required.

British Standard Conversion Tables.

The British Engineering Standards Association has recently issued comprehensive tables of conversion of inches to millimetres and millimetres to inches, covering both fractional and decimal subdivisions of an inch, to the various degrees of accuracy mostly used in the classes of work coming within the scope of the Association. Included in the pulication is a table of conversion factors for linear, square, and cubic measures, weights, stresses, pressures, and weights per unit length, for various measures common in engineering. The figures have been checked by the National Physical Laboratory, and the publication is printed from stereotype plates, so that there may be no risk of errors resulting from displacement of type. It is felt, therefore, that the tables may be used with every confidence.

Copies of the publication, No. 350—1930, may be obtained from the Publications Department, British Engineering Standards Association, 28, Victoria Street, London, S.W.1, price 2s. 2d. post free.

Fatality.

Whilst measuring between the poles of the Shropshire, Worcestershire & Staffordshire Electric Power Co.'s system at Catshill, Bromsgrove, on July 2nd, Mr. N. H. Cocks received a fatal electric shock of 6,000 V. It was discovered that his tape measure, containing a metal substance, had come into contact with a live wire.

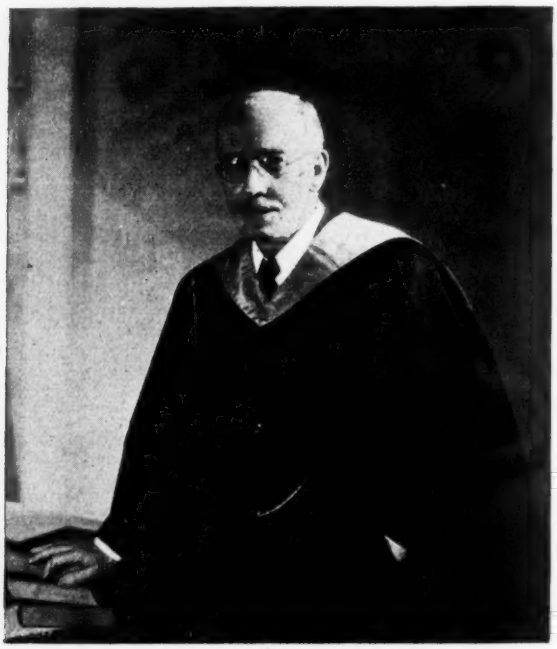
Voltage Drop on Consumers' Wiring.

In a report of the Lamp Committee of the National Electric Light Association (U.S.A.) attention is given to determining the voltage drop between the service entrance and lamp socket. This drop is determined by the differences of simultaneous readings at the lamp socket and at the service entrance. Compared with the size of the field, the number of drop determinations quoted is very small, yet the individual results are sufficiently consistent to warrant the conclusion that the supply authorities should allow at least 2 V extra at the service to compensate for the interior drop in residences. For commercial service the allowance should be not less than 3 V. In large factories with long runs of wiring, and heavy loads, very heavy voltage drops can be expected.

Our Personal Column.

Electrical men are invited to enable us to keep readers of the "Electrical Review" posted concerning their movements.

Mr. G. H. Nisbett, the managing director of British Insulated Cables, Ltd., received the honorary degree of Master of Engineering from the University of Liverpool on July 5th.



Mr. G. H. Nisbett,
Who has received the Hon. M.Eng. Degree from Liverpool University.

Mr. Nisbett commenced his career in 1883 and joined his present company (then the British Insulated Wire Co.) in 1894. We reproduce a portrait of Mr. Nisbett in academic robes.

Mr. A. L. Lunn, deputy chief engineer of the Manchester Electricity Department, notified the Electricity Committee recently that he had been offered another appointment and asked if the Committee would be willing to release him from his engagement in the event of his accepting the offer. The Committee recommends that if Mr. Lunn desires it he shall be released from his contract of service as and from September next. Our readers may have noticed that the position of deputy chief at Manchester was advertised in our last issue. We learn that Mr. Lunn is leaving the public electricity supply sphere but his departure from Manchester will not involve his complete severance from local affairs. He will serve as next chairman of the North-Western Centre of the I.E.E.

Mr. J. Rendell Baker, borough electrical engineer of Halifax, was recently recommended by the Electricity Committee for an increase in salary from £1,200 to £1,300 by two equal instalments. The Council, however, rejected the proposal but emphasised the fact that this was entirely on account of stringent financial conditions in the town.

Mr. J. R. Wignall, principal technical assistant in the permanent way branch of the L.C.C. Tramways Department, is retiring in August.

Mr. E. W. Edmonds, senior technical assistant, is recommended for the post at a salary of £730 per annum. **Mr. E. H. Beal,** technical assistant (Grade I) is recommended for the appointment of senior technical assistant at £590 per annum, and **Mr. H. Raine,** technical assistant (Grade II) for promotion to Grade I at £460 per annum.

Mr. W. A. Wardle, principal assistant of the Liverpool Lighting Engineers' Department, has retired after 40 years' service. At a recent gathering of the staff he was presented with a chiming clock and an all-mains radio set.

Sir George A. Touche has resigned from the chairmanship of the Anglo-Argentine Tramways Co., Ltd., on account of ill-health. He is succeeded by the Duke of Atholl.

Mr. A. E. Aird, electrical installation engineer in the Liverpool Electric Supply Department, has been appointed assistant distribution engineer at a salary of £550 per annum, in the place of Mr. C. M. P. Lucas who has retired.

Mr. and Mrs. H. R. Kempe celebrated their golden wedding on July 8th.

Dr. J. F. Crowley's business address (J. F. Crowley and Partners) is now Westminster House, Great George Street, S.W.1.

Mr. J. Scrivener has been re-appointed managing director of Electrolux, Ltd., as from July 1st, a position which he held from the inauguration of the company in 1921 until 1926.

Mr. W. S. Corner, chief assistant electrical engineer of the N.S.W. Government Railways, is at present on a visit to London.

Mr. A. E. Roots, the Dumfries electrical engineer and manager, is to receive £100 instead of £50 as his first annual increment and the Burgh Council has also decided that thereafter his salary shall rise by annual increments to £720.

Mr. F. H. Whysall, city electrical engineer, Belfast, is to be placed on the A.M.E.E. salary scale. This means that his present salary of £1,700 will be raised to £1,967 per annum as from April last.

Mr. Christopher Wade (Gabriel, Wade & English, Ltd.) is laid up at home as the result of an operation, but hopes to be about again in three weeks' time.

Mr. M. S. Sloan, whose portrait appears herewith, is the retiring president of the National Electric Light Association, whose annual convention took place last month. One of the points which he stressed in his presidential address

Mr. M. S. Sloan,
President of the N.E.L.A., 1929-30.

was the gradual lengthening of the period of capital turnover in the electricity supply industry. Mr. Sloan is president of the important New York Edison Co. and affiliated companies.

Obituary.

Mr. J. E. Waller.—We regret to record the death, on July 5th, of Mr. John Edward Waller, formerly senior partner of the firm of Kincaid, Waller, Manville and Dawson. Mr. Waller was born in Dublin in 1856 and was engaged in railway work until 1883 when he took up consulting work. He joined Mr. Joseph Kincaid as his chief assistant in 1885, and in 1893 he, Mr. Kincaid and Mr. E. Manville formed a partnership which was joined by Mr. (now Sir) Philip Dawson in 1902. He retired from the firm in 1924. Mr. Waller was responsible for a good deal of railway and tramway work, including the electric tramway undertakings at Swansea, Central Birmingham, Exeter, the Isle of Man, the Isle of Thanet, Scarborough, South Lancashire and Hastings. The funeral took place at Golders Green on Wednesday last.

Will.—The late Mr. ANDREW WILSON TAIT, C.B.E., a director of several electrical and allied companies, left estate valued at £529,266 gross (£499,191 net personalty).

Financial Section.

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares.

New Companies Registered.

E.R.A. Patents, Ltd.—Private company registered June 28th. Capital, £500. Objects: To acquire patents and inventions, to promote scientific and industrial research in connection with the electrical and allied trades and to carry on the business of electrical engineers. The directors are: Ll. B. Atkinson (director, C.M.A.); H. W. Clothier (A. Reyrolle and Co., Ltd.); A. McKinstry (Metropolitan-Vickers Electrical Co., Ltd.); M. J. Railing (General Electric Co., Ltd.); V. Watlington (English Electric Co., Ltd.); and E. B. Wedmore (director, British Electrical and Allied Industries Research Association).

Witty & Wyatt (Cardiff), Ltd.—Private company. Registered July 3rd. Capital, £4,000 in £1 shares. Objects: To acquire all or any part of the undertaking property and assets of Witty & Wyatt (Cardiff), Ltd. (incorporated in 1905, and now in voluntary liquidation), and to carry on the business of manufacturers of and dealers in asbestos and asbestos and india-rubber goods, &c. The subscribers (each with one share) are: J. W. James, 29, Bishops Road, Whitchurch, Glam., merchant; R. Butterworth, 55, Ninian Road, Cardiff, solicitor. J. W. James is managing director. Registered office: 5, Burt Street, Cardiff.

Electrical & Radio Products, Ltd.—Public company. Registered July 3rd. Capital £1,000 in 2s. 6d. shares. Objects: To adopt an agreement with Aeonic Radio, Ltd., and the liquidator thereof, to manufacture, assemble, repair, sell and let on hire, radio-gramophones, radio receivers, television, electrical, magnetic, and radioactive instruments and switchboards, mouldings and apparatus, &c. The subscribers are: G. Conrad, 103, Phyllis Avenue, New Malden, clerk; A. E. Patterson, 4, Bemsted Road, Walthamstow, E.17, clerk; and five other clerks. The first directors are to be appointed by the subscribers. Registered office: 1, Queen Victoria Street, E.C.

Thomas Baldwin, Ltd.—Private company. Registered July 1st. Capital, £3,000 in £1 shares. Objects: To carry on the business of electrical engineers and contractors, dealers in electrical machinery, refrigerators, vacuum and other cleaners, medical apparatus, televisual apparatus, &c. The directors are: T Baldwin, Caithness, Victoria Drive, Bognor, and G. Baldwin, 10, Marshall Avenue, Bognor, electricians. Registered office: 39, West Street, Bognor.

Sword & Co., Ltd.—Private company. Registered July 4th. Capital, £500 in £1 shares. Objects: To acquire the business of an electrical engineer and contractor carried on by F. Sword at 29, Withington Road, Whalley Range, Manchester, as "Sword & Co." The subscribers (each with one share) are: H. G. Mason, Townscliffe, Mellor, manufacturers' agent; F. Sword, 29, Withington Road, Whally Range, Manchester, electrical engineer; H. G. Mason, permanent governing director. Solicitors: Bullock, Worthington & Jackson, Manchester.

A. S. Tyler & Co., Ltd.—Private company. Registered July 4th. Capital, £100 in £1 shares. Objects: To carry on the business of electrical, mechanical and automobile engineers, manufacturers of wireless receivers, cinema apparatus, &c. The subscribers (each with one share) are: A. S. Tyler, "Red Gate," Athol Road, Whitstable, electrical engineer; Mrs. G. E. M. Tyler, "Red Gate," Athol Road, Whitstable. The directors are to be appointed by the subscribers. Registered office: 98, High Street, Whitstable.

Bloomsbury Wireless Co., Ltd.—Private company. Registered July 3rd. Capital, £500 in £1 shares. Objects: To acquire the undertaking and all or any assets and liabilities of Nellie Vranche trading at the Bloomsbury Wireless Co. at North Street, Bloomsbury, and to carry on the business of manufacturers of and wholesale and retail dealers in radio transmitting and receiving sets and accessories, electrical apparatus, &c. The directors are: P. Weinbaum, 28, Sidney Square, Sidney Street, E.1, wireless dealer (managing and permanent director); L. Hammerson, 177, Seven Sisters Road, Finsbury Park, N.4, wireless dealer; F. Loveridge, address not stated. Secretary: F. Loveridge. Registered office: 27-28, King William Street, E.C.4.

Automatic Internal Telephones, Ltd.—Private company. Registered July 4th. Capital, £2,500 in £1 shares. Objects: To carry on the business of manufacturers and repairers of and dealers in telephones, message-transmitting apparatus, &c. The subscribers (each with one share) are: H. King, 15, Rothesay Road, South Norwood, S.E.25, solicitors' managing clerk; J. N. Hoare, 32, Warner Road, Hornsey, N.8, solicitors' clerk. The first directors are to be appointed by the subscribers. Solicitors: Wedlake Letts & Birds, 11, Serjeants Inn, E.C.4.

Official Returns of Electrical Companies.

Bowers & Barr, Ltd.—Mortgage on freehold warehouse in Row 71, Great Yarmouth, with fixtures, &c., dated June 24th, 1930, to secure all moneys due or to become due from the company to the National Provincial Bank, Ltd.

Macartney, McElroy & Co., Ltd.—W. C. Smith, 48, Copthall Avenue, E.C.2, was appointed receiver on June 23rd, 1930, under powers contained in first mortgage debentures dated July 11th, 1923.

Newcastle-upon-Tyne Electric Supply Co., Ltd.—Particulars filed of £2,500,000 debentures (including £2,146,508 already registered) and covered by supplemental trust deed dated June 20th, 1930, charged on the property and assets comprised in and subject to the provisions of the principal trust deed dated June 30th, 1909, the amount of the present issue being £353,492. Trustees: Whitehall Trust, Ltd.

Oldham Electrical Contractors, Ltd.—Capital, £1,000 in £1 shares. Return dated June 11th, 1929 (filed April 11th, 1930). 503 shares taken up. £203 paid. £300 considered as paid. Mortgages and charges, nil.

Leatherhead & District Electricity Co., Ltd.—Capital, £130,000 in 25,000 preference, 25,000 "B" preference, and 80,000 ordinary shares of £1 each. Return dated March 26th, 1930. All shares taken up. £123,321 10s. paid (being £1 per share on 25,000 preference, 17,970 "B" preference, and 80,000 ordinary, and 1s. per share on 7,030 "B" preference). Mortgages and charges, £101,350.

Beck & Moss, Ltd.—Capital, £2,500 in £1 shares. Return dated March 29th, 1930. All shares taken up. £525 paid. £1,975 considered as paid. Mortgages and charges, nil.

Wellingborough Electric Supply Co., Ltd.—Capital, £50,000 in £10 shares. Return dated April 7th, 1930. 4,500 shares taken up. £45,000 paid. Mortgages and charges, £20,000.

H.P. Electrical Co., Ltd.—Capital, £1,000 in £1 shares. Return dated March 18th, 1929 (filed May 16th, 1930). 654 shares taken up. £654 paid. Mortgages and charges, nil.

Wilfrid Francis & Co., Ltd.—Capital, £1,000 in £1 shares. Return dated March 26th, 1930. 490 shares taken up. £490 paid. Mortgages and charges, nil.

Harrow Electric Light & Power Co., Ltd.—Capital, £50,000 in 3,333 preference and 6,667 ordinary shares of £5 each. Return dated March 30th, 1930. All shares taken up. £50,000 paid. Mortgages and charges, £25,000.

Yarmouth (I.W.) Electricity Supply Co., Ltd.—Capital, £5,000 in £5 shares. Return dated March 13th, 1930. 361 shares taken up. £1,805 paid. Mortgages and charges, nil.

Chesham Electric Light & Power Co., Ltd.—Capital, £200,000 in 125,000 ordinary and 75,000 unclassified shares of £1 each. Return dated March 5th, 1930. 125,000 ordinary shares taken up. £110,000 paid. £15,000 considered as paid. Mortgages and charges, nil. A return of allotments, made up to March 15th, 1930, shows a further 30,000 issued as ordinary and fully called up.

Northallerton Electric Light & Power Co., Ltd.—Capital, £6,500 in 2,900 preference shares of £1 and 12,000 ordinary shares of 6s. each. Return dated March 21st, 1930. 1,161 preference and 11,415 ordinary shares taken up. £4,585 10s. paid. Mortgages and charges, £3,900.

Gent & Co., Ltd.—Capital, £50,000 in 20,000 preference and 30,000 ordinary shares of £1 each. Return dated March 4th, 1930. 4,427 preference and 20,876 ordinary shares taken up. £6,887 paid on 957 preference and 5,930 ordinary shares. £18,416 considered as paid on 3,470 preference and 14,946 ordinary shares. Mortgages and charges at date of return, £16,500 (£6,500 since paid off). Return of allotments made up to March 21st, 1930, shows a further 3,000 preference and 3,500 ordinary shares allotted, payable in cash and fully called up.

Transmutograph, Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated June 11th, 1930, to secure all moneys due or to become due from the company to Barclay's Bank, Ltd.

Campbell & Addison, Ltd.—Issue on June 20th, 1930, of £1,100 debentures, part of a series already registered.

London Nigerian Power Co., Ltd.—Particulars filed of £200,000 debenture stock authorised January 30th, and covered by trust deed dated June 10th, 1930, charged on a lease comprising a dam site and a generating site with the power stations thereon and conferring the right to use water of the Kwall Falls on the N'Gell River, Nigeria, for the generation of hydro-electric power, and the company's undertaking and property, present and future, including any uncalled capital, the whole amount being now issued. Trustees: New Consolidated Goldfields, Ltd., 49, Moorgate, E.C.2.

Solaflex (1930), Ltd.—Issue on June 4th, 1930, of £1,100 debentures, part of a series already registered.

English Electric Co., Ltd.—Particulars filed of £750,000 debenture stock (inclusive of £450,936 outstanding under trust deed dated August 14th, 1923), authorised February 25th, and covered by trust deed dated June 17th, 1930, the amount of the present issue being £299,064. Property charged: The company's undertaking and property, present and future, including uncalled capital, and freehold and leasehold hereditaments in Bradford, Calverley, Preston, Ashton-upon-Ribble, Coventry, Bilton, Rugby, Shilton, Hough, and Castlechurch. Trustees: Anglo-American Debenture Corporation, Ltd.

Northampton Electric Light & Power Co., Ltd.—Capital, £700,000 in 75,000 preference and 625,000 ordinary shares of £1 each. Return dated March 14th, 1930. 52,500 preference and 547,500 ordinary shares taken up. £600,000 paid. Mortgages and charges, £400,000.

W. E. Dove & Co., Ltd.—Capital, £3,500 in £10 shares. Return dated March 3rd, 1930. 320 shares taken up. £2,000 paid. £1,200 considered as paid. Mortgages and charges, £800.

Burgess Hill & District Electric Supply Co., Ltd.—Capital, £16,000 in 3,000 preference, 4,000 "A" preference, 3,000 "B" preference, and 6,000 ordinary shares of £1 each. Return dated April 8th, 1930. 3,000 preference, 4,000 "A" preference, and 5,250 ordinary shares taken up. £10,400 paid. £1,850 considered as paid. Mortgages and charges at date of return: £1,200 (since paid off).

Mather & Platt, Ltd.—Capital, £2,500,000 in 40,000 preference shares of £10 and 2,100,000 ordinary shares of £1 each. Return dated March 14th, 1930. 40,000 preference and 1,363,660 ordinary shares taken up. £630,660 paid on 29,200 preference and 338,660 ordinary shares. £1,133,000 considered as paid on 10,800 preference and 1,025,000 ordinary shares. Mortgages and charges, nil.

Stella Conduit Co., Ltd.—Capital, £20,000 in £1 shares. Return dated November 1st, 1929 (filed May 1st, 1930). All shares taken up. £20,000 considered as paid. Mortgages and charges, nil.

H. T. C. Electrical Co., Ltd.—Capital, £2,500 in £1 shares. Return dated December 6th, 1929 (filed March 29th, 1930). All shares taken up. £950 paid. £1,550 considered as paid. Mortgages and charges, nil.

West Insulating Co., Ltd.—Capital, £1,500 in £100 shares. Return dated May 9th, 1930. 10 shares taken up. £1,000 paid. Mortgages and charges, nil.

Looe Electricity Co., Ltd.—Capital, £8,000 in £1 shares. Return dated April 28th, 1930. 5,900 shares taken up. £5,900 paid. Mortgages and charges, nil.

Giljay, Ltd.—Capital, £1,000 in £1 shares. Return dated June 11th, 1929 (filed March 14th, 1930). 975 shares taken up. £801 paid. £174 considered as paid. Mortgages and charges, nil.

Magnoid (Bristol), Ltd.—Capital, £1,000 in 600 preference and 400 ordinary shares of £1 each. Return dated February 24th, 1930. All shares taken up. £400 paid on the ordinary shares. £600 considered as paid on the preference shares. Mortgages and charges, nil.

Child's Electrical Stores, Ltd.—Capital, £1,000 in £1 shares. Return dated December 31st, 1929 (filed March 3rd, 1930). All shares taken up. £2 paid. £998 considered as paid. Mortgages and charges, £502 15s.

City Notes.

Globe Telegraph and Trust Co., Ltd.

The annual meeting was held on June 30th, Lord Midleton (chairman) presiding. In presenting the report and accounts (ELECTRICAL REVIEW, June 27th, p. 1209) the chairman said that in July last their ordinary stocks and shares in the Eastern Associated Cable Companies were transformed into three classes of stock of Cables & Wireless, Ltd. They had disposed of half of the "B" stock allotted to them, as it was not anticipated that it would be interesting bearing in the immediate future. They had also reduced their holding in the "A" stock by £38,000, retaining over £3,000,000, and they had retained their holding of £4,823,000 of 5½ per cent. preference stock. During the year they had disposed of their holding in the American Telegraph & Cable Co., and had also accepted an offer from the Postal Telegraph & Cable Corporation (Commercial Cable Co.) to purchase their small holding in the Commercial Union Telegraph Co. The Indo-European had also passed into the hands of Cables and Wireless, Ltd. The extended investment powers taken last year had enabled them to secure substantial holdings in electrical undertakings which were doing good business and showed promise of steady expansion in the future, but the full benefit of the income derived from these investments would not appear until next year. The report and accounts were adopted.

Petters, Ltd.

The net profit for the year ended March 31st last, after providing for depreciation, taxation, &c., was £40,917 (against £32,891 for 1928-29). The addition of £28,536, less £6,000 in respect of the preference dividend for the first half year, makes available £63,453. The balance of the preference dividend is to be paid, together with the interest on the funding certificates; £1,000 is transferred to the redemption fund for those certificates, and £10,000 to reserve. It is proposed to increase the ordinary dividend from 6 to 7 per cent., leaving £39,038 to be carried forward. The extensions to the works and plants have been completed. The Atomic Diesel engine is now being made in sizes up to 400 h.p., and a new automatic electric lighting plant has been introduced. During the year Mr. J. Vincent, J.P., retired from the board, his place being taken by Capt. A .S. Keep, M.C., B.Sc.

W. T. Henley's Telegraph Works Co., Ltd.

The report for the year ended March 31st last shows a gross profit of £374,264, as compared with £354,567 in the preceding year. After deducting debenture interest, &c., and adding £545,280 brought forward, there is a total of £851,418 available. Income tax absorbs £24,788 and reserve receives £50,000. It is proposed to pay a final dividend on the ordinary shares of 2s. 6d. per share, less tax, making 4s. for the year, and a bonus of 2s. per share, less tax (same for 1928-29), leaving £572,630 to be carried forward. The report records with regret the death of Mr. A. A. Campbell Swinton. Meeting: July 18th.

"Underground" Group Dividends.

The railway companies incorporated in the London "Underground" group have maintained their interim dividends at last year's rates. These are as follows:—

Metropolitan District Railway Co.—Ordinary, 2½ per cent.

London Electric Railway Co.—Consolidated ordinary, 2½ per cent.

Central London Railway Co.—Undivided ordinary, 2½ per cent.; preferred ordinary, 2 per cent.

City and South London Railway Co.—Consolidated ordinary, 2½ per cent.

Underground Electric Railways Co. of London, Ltd.—Ordinary, 3 per cent.

Edmundsons' Electricity Corporation, Ltd.

The accounts for the year ended March 31st last show a net profit of £204,777 (against £149,272 for 1928-29). It is proposed to pay a final dividend on the increased ordinary capital of 3½ per cent., making 7 per cent. for the year (8 per cent. on lower capital for 1928-29), leaving £34,159 to be carried forward. Meeting: July 15th.

Edmundsons' Debenture Issue.

On Tuesday last Edmundsons' Electricity Corporation, Ltd., published a prospectus offering for subscription £1,000,000 of 5 per cent. debenture stock at £93 10s. per cent. The prospectus showed, *inter alia*, that under agreements dated July, 1929, 800,000 of the company's £1 ordinary shares were issued to the Greater London and Counties Trust, Ltd., in consideration of the purchase of the Trust's holdings in the Wessex Electricity, East Anglian, Cookham and District, Oxford, Western Electricity Supply and Urban Electric Supply Companies. The issued capital of the company consists of £400,000 7 per cent. cumulative preference shares of £1 each and 2,360,000 £1 ordinary shares (2,750,000 authorised). Ordinary

dividends of 10 per cent. were paid in respect of 1926-27 and 1927-28; in the following year (1928-29), when the capital had been increased by a bonus issue of 600,000 £1 ordinary shares, the rate was 8 per cent. For 1929-30 a dividend of 7 per cent. is proposed. The proceeds of the issue are required for the redemption of temporary loans and for the general development of the company's business.

Greenwood & Batley, Ltd.

Presiding at the annual meeting on June 30th, Col. O. C. Armstrong said that the past year had been uneventful so far as the company was concerned. They had hoped that some betterment in trade conditions might take place, but all forecasts of brighter days proved false. Nevertheless, they had been fortunate enough to secure sufficient work to enable them to maintain the position which they had held since the tide turned against them. For the first time for many years there seemed justification for the hope that trade might improve and that in the not too distant future some of the export trade which had been lost might be regained. The report and accounts were adopted.

Marconi's Wireless Telegraph Co., Ltd.

The report issued last week covers the two-year period ended December 31st, 1929. The profit is stated to be £796,235 to which is added £23,777 brought forward from 1927, making £820,012. From this the following amounts are deducted:—Directors' additional remuneration for 1927 and 1928, £1,500; two years' dividends on the 7 per cent. preference shares, £35,000; extra 10 per cent. on preference for 1928, £25,000; and interim ordinary dividend for 1928 (20 per cent.), £400,027, leaving an available balance of £354,485. As we reported in our last issue it is proposed to pay an ordinary dividend of 15 per cent., and 5 per cent. extra on the preference shares in respect of 1929. A balance of £38,966 is carried forward. With the exception of £19,416, redeemed in cash, the whole of the debenture stock outstanding at December 31st, 1927, has been converted into ordinary shares (395,114 of £1 each). Reference is made of the carrying into effect of the Cables and Wireless merger. Meeting: July 14th.

Cables and Wireless, Ltd.

The first accounts of this company, covering the period from April 8th, 1929, to the end of the year, show that the receipts from Marconi's Wireless Telegraph Co., Ltd., and the constituent cable companies amounted to £1,445,977, and the addition of transfer fees made the total revenue £1,449,106. Administration and general expenses, directors' fees and taxation absorbed £121,795, leaving a net profit of £1,327,311. The preference dividend requires £1,263,053, leaving a balance of £64,257 which is carried forward.

Imperial & International Communications, Ltd.

This company's first report covers the last nine months of 1928 and the whole of 1929. The gross profits amounted to £11,381,262, while working expenses, administration charges, taxation, rentals, directors' fees, &c., absorbed £9,357,107, leaving a net profit of £2,023,155. It is stated that this rate of profit (about £1,156,000 per annum) is not expected to be maintained during the current year; the figure of £600,000 is mentioned. The report says that considerable economies have been effective and further savings will be made. Reference is made to what is described as the unfair competition of the Post Office in the matter of overseas telephony.

Electric and General Investment Trust, Ltd.

Presiding at the annual meeting on June 30th, Mr. J. B. Braithwaite (chairman) said that the balance of net revenue amounted to £10,156. The final balance of income certificates had been redeemed and there was nothing now to interfere with the distribution of the profits to shareholders. The investments stood in the balance sheet at £240,114, as against £232,066, an increase of approximately £8,000, and a valuation, made on May 31st this year, showed them to be worth appreciably more. The Trust's position, therefore, was a very satisfactory one. The report and accounts were adopted.

Aron Electricity Meter, Ltd.

The report for the year ended March 31st last states that having regard to the new Companies Act, and in view of the considerable alterations and improvements in the London factory during the year, &c., the company's assets, including the holdings in subsidiary companies, have been re-valued. The profit amounted to £2,009 (against £6,594 for 1928-29), to which is added £1,801 brought forward and £1,100 transferred from reserve. After the payment of debenture interest a balance of £82 is carried forward.

Great Northern Telegraph Co.'s Holding Co., Ltd.

The directors propose to distribute for the second financial year ended June 30th a total dividend of 20 per cent., to set aside £13,889 for taxes, and to carry forward £2,866.

Hall Telephone Accessories (1928), Ltd.

The directors have declared an interim dividend of 5 per cent., as against 4 per cent. last year.

Stocks and Shares.

TUESDAY EVENING.

THE monetary situation controls the outlook for gilt-edged stocks and shares, the outstanding feature of which continues to be the strength shown by fixed-interest securities generally. With the turn of the half-year, a good deal of dividend money became released and some, at all events, of the capital has returned to the Stock Exchange markets, those especially being favoured in which purely gilt-edged securities are domiciled. The keen attention, amounting to anxiety, which awaited the issue of the first report from Cables & Wireless, Limited, has now been met—we will not say satisfied—by the issue of the document itself. Prior to the publication of the figures, and in order to allay the profound nervousness which had been caused, it was officially announced that the dividend on the 5½ per cent. preference stock for this current year, 1930, would be paid.

Cables and Wireless Stock.

Publication of the Merger's report failed to prevent a renewed outbreak of weakness in the stocks. The figures in the report show that, adding together the profits and the interest on investments, there is enough to cover the preference dividend service, and to leave a slender margin to be carried forward, assuming, that is to say, that the profits amount to the £600,000 which, according to the Imperial and International Communications Company, will be earned by Cables & Wireless in the present year. If, however, profits should fail to reach £600,000, it is obvious that the dividend on the Cables 5½ per cent. preference stock would be in jeopardy. Nor does the effect of the preference dividend being cumulative remove the unpleasant feeling that the security, so far from being the first-class investment which hitherto it had been considered, must be relegated to a lower rank. Hopes of dividends on the "A" and "B" stocks will have to be put on one side for the time being.

Stock Exchange Market Effect.

The disappointment is reflected in further sharp falls in the prices. The preference stock has fallen 11 points to 77½, the "A" ordinary is 10 down at 27½, and the "B" ordinary, now no better than a gambling counter, stands at 12½, showing a fall of 5 on the week. In sympathy, the price of Globe Telegraph and Trust ordinary shares has dropped 30s. to 17½. The incident is one of the most disastrous that has befallen the Stock Exchange world for some time past, for Cables and Wireless preference had been regarded as outside the pale of speculation, and as being recommendable to the investor who wanted sound security offering a reasonable, though far from extravagant, rate of return on the money. The speech of the chairman at the forthcoming meeting is likely to throw further light on the situation, but it is awaited with resignation rather than hopefulness. At the root of the trouble lies the world-wide shrinkage in trade which is mainly responsible for the falling-off in receipts. At the same time, it is now evident that the Merger was over-capitalised from the start. Moreover, the Post Office has proved a competitor instead of a co-operator.

Anglo-American Telegraph preferred has fallen a point to 102½. The deferred stock is down 10s. to 24s. Anglo-American Telegraph and Telephone stock weakened to 212½. Internationals are without alteration at 45. Marconi Marines have advanced to 1¾. Canadian Marconis are neglected, the nominal price being 18s. 9d.

New Issues.

An offer has been made this week of £1,000,000 5 per cent. debenture stock at 93½ by Edmundsons' Electricity Corporation, and there was a good demand for the underwriting. The security is considered to be sound. The company is under the virtual control of the Greater London & Counties Trust, the Anglo-American concern of which Lord Birkenhead is chairman. In one way and another, Edmundsons' is interested in about seventy electricity supply undertakings. In the Ferranti issue of £250,000 7 per cent cumulative preference shares, which were offered at par, the underwriters were called upon to take up about half of their obligations. Dealings started in the shares on the basis of 3d. discount. In this case, it is probable that no long time will be required before the shares settle into the hands of permanent holders, and the discount which developed in the price is likely to have the effect of bringing in some of the prospective purchasers who may have anticipated a poor response to the new issue, and who elected, therefore, to await the allotment before purchasing the shares. Pirelli-General Cable Works 5½ per cent. first mortgage guaranteed debenture stock has recently been marketed, and the price is about 100¾. The company is paying a dividend on its ordinary shares of 17½ per cent. The new Scottish Power shares are dull at 3d. discount, the reason for this being the competition that prevails from other similar investments. County of London new preference are a firm market at 8s. premium, which is a little better than the price of a week ago. The Newcastle-on-Tyne 5 per cent. debenture stock, offered at 96 and subscribed twice over, is quoted at 10s. premium. The issue of two or three other new offers is contemplated during the current month. Promoters will

no doubt be eager to take advantage of the prevailing cheapness of money, and of the attention upon which they can count in offering good shares at any reasonable price.

London Electric Railways.

The Underground Electric Railways of London group has announced its interim dividends, all of which are at the same rate as that declared a year ago. The Underground Electric Railways receive 3 per cent. The dividend on the last-named for the whole of 1929 was 8 per cent., and some of the optimists, as already repeated here, are talking of the possibility of an increase in the final dividend for the year in view of the excellent traffics which the company is securing. The price of the ordinary shares has risen to 24s. 6d., at which there are buyers. The income bonds are nominally unchanged at 105 ex rights. In spite of the warnings given to holders of the income bonds that they should on no account miss the opportunity for converting their bonds into shares, the last day to do which was June 30th, it would appear as though some of them, at all events, neglected to exchange their bonds for shares. The bonds are now repayable at the company's option at 103. Metropolitan consolidated is 1 better at 65½, and Districts at 77½ have gained the fraction.

Home Electricity Shares.

The market for shares in the Home electricity companies is very placid. Changes in price are few and far between. City of London ordinary retain their rise at 33s. 9d., and there is an insistent demand for all the good preference shares. Electric Supply Corporation are 1/16 up at 48s. 3d., following upon the rise which took place last week. Midland Counties are a little better at 27s. 6d. Richmond (Surrey) remain at 42s. The company has declared an interim dividend of 4 per cent., payable on August 15th, the Bournemouth and Poole Company an interim dividend of 6 per cent., payable on the same day. Both these dividends correspond with those declared a year ago. Bournemouth and Poole are unchanged at 57s. 6d. There has been a little demand for Clyde Valley, without causing any quotable movement at 38s. 3d., and Newcastle-on-Tyne ordinary are also in request at 22s. 6d. British Power and Light at 13s. 9d. are the same as they were a week ago. Atlas ordinary strengthened to 25s. 6d.; the preference are unchanged at 24s. London Power 5 per cent. debenture came into demand at 100.

Foreign Traction and Power.

Anglo-Argentine Tramways are heavy, the 5 per cent. debenture stock losing 2 points at 65½, and the first preference shares going back to 2 7/16. The statement made at the meeting suggests that the competition with which the company is faced does not become any less aggressive. The chairman, Sir George Touche, has resigned his position on the ground of ill-health. His place has been taken by the Duke of Atholl. Brazilian Tractions have gone back to 10, the preference shares to 130. Mexico Tramway 5 per cent. bonds are weak at 63½, showing a drop of 4 points, and the seconds fell to 37½. The Mexican group as a whole is depressed. A fall of 6 points lowered Mexican Light and Power common shares to 70½; the 7 per cent. preference are easier at 75½. The first mortgage bonds remain at 81, but the seconds are lower at 68. Brazilian issues are dull, on account of a heavy and general fall in Brazilian Government bonds. Amongst Colonials, Perak Hydro-Electric 7 per cent. debenture gave way to 104½.

Manufacturing and Equipment.

The tendency amongst stocks and shares in the section devoted to manufacturing and equipment companies is inclined to be dull, though there are one or two bright spots, of which the principal is a rise of 2s. 6d. in General Electric ordinary. This has lifted the price to 50s., which looks by no means an unreasonable figure, in view of the yield, £5 12s. per cent., that the shares offer, on the basis of the increased dividend of 14 per cent. recently declared for 1929. Henley's have lost ¼, falling to £6. English Electric ordinary are flat at 15s., and the preference at 12s. 6d. Brush ordinary stock has changed hands down to 116, although the nominal price is left unchanged at 120. The company has secured an order for 100 double-decked tramcars from the Leeds County Council. The contract is stated to represent a figure of something like £165,000. Babcock & Wilcox hardened at 55s. bid. A brisk rise occurred in Vickers, lifting the price 1/16 to 8s., on the publication of the bankers' resolution advocating inter-Empire free trade and restriction of foreign imports. This manifesto, together with the subsequent political developments, have produced a cheerful feeling amongst holders of iron, coal, steel and allied shares, with the result that a good many rises have occurred throughout the list. The rubber share market relapsed after a brief spasm of strength induced by the proposal that British and Dutch interests should agree to a 25 per cent. restriction of output until the time when rubber reaches the pivotal price of 9d. per lb. Philips Lamps recovered to 60s. Hall's Telephone Accessories rose 6d. further to 14s. 9d. on the increase in the interim dividend. Ever-Ready shares, after being 16s., rallied to 16s. 6d.

Dollar stocks and shares are irregular. Shawinigans at 68½ have gained a point. Pennsylvania Water and Power advanced, equally, to 74½. Power Corporation of Canada shares keep at about 70. Hydro-Electrics show a fall of 2½ to 37½; Radio Corporations have given way to 34¾ and International Holdings to 4¼.

Share List of Electrical Companies.

HOME ELECTRICITY COMPANIES.

	Nom.	Approx. Dividend. 1928.	1929.	Price July 8 1930.	Rise or fall	Yield p.c.
	£					
Bournemouth and Poole	1	15	15	57/6	—	5 4 8
Brompton Ordinary	1	8½	8½	26/6	—	5 5 8
Charing Cross Ordinary	1	8½	8½	28/-	—	5 0 0
do. do. 4½% Pref. ...	1	4½	4½	18/-	—	5 0 0
Chelsea	1	8⅞	8⅞	26/6	—	5 5 8
City of London	1	10	10	33/9	—	4 3 1
do. do. 6% Pref.... ...	1	6	6	23/-	—	5 4 4
Clyde Valley	1	8	8	38/3	—	4 3 9
County of London	1	7	10	43/9	—	4 7 4
do. do. 6% Pref.... ...	1	6	6	23/-	—	5 4 4
Edmundson's 7% Pref.	1	7	7	24/6	—	5 14 3
Elec. Supply Corporation	1	11	11	48/3	+1/16	4 11 3
Kensington Ordinary	1	8	8	27/6	—	5 1 10
Lancs. Light and Power	1	7½	7	24/6	—	5 14 3
London Electric	1	8½	9	29/6	—	4 15 0
Metropolitan	1	9	10	40/-	—	5 1 3
do. 4½% Pref.	1	4½	4½	17/-	—	5 6 0
Midland Counties	1	6½	7	27/6	+6d.	5 1 10
Mid. Elec. Power	1	15	8	32/-	—	5 0 0
Newcastle-on-Tyne Ordinary ...	1	6	6	22/6	—	5 6 8
do. 7% Pref.	1	7	7	26/-	—	5 7 8
Notting Hill 6% Pref.	10	6	6	10⅞	—	5 11 4
North Met. Elec. 6% Pref.... ...	1	6	6	22/6	—	5 5 9
St. James' and Pall Mall	1	8	8	28/-	—	5 0 0
Scottish Power	1	8	8	28/-	—	5 14 4
South London	1	8½	8½	27/6	—	5 1 10
Urban Ordinary	1	7	7	32/6	—	4 6 2
Westminster Ordinary	1	8½	8½	27/-	—	5 3 8
Whitehall Elec. Invst. 7½% Pref....	1	7½	7½	24/6	—	6 2 5
Yorkshire Elec.	1	8	8	31/3	—	5 2 3

HOME RAILS.

Central London Ord. Assented ...	Stock	4	4	77	—	5 4 0
Metropolitan	,,	3½	4	65½	+1	6 2 2
do. District	,,	4	5	77½	+½	6 9 0
Underground Electric	£1	7	8	24/6	+6	6 10 8
do. do. Income ...	Bonds	6	6	105	—	5 14 3

TELEGRAPHS AND TELEPHONES

Anglo-Am. Tel. Pref.	Stock	6	6	102½	—1	5 17 0
do. Def.	,,	1½	1½	24	—½	6 5 0
Automatic Telephone	1	10	12½	36/3	—1/16	6 18 2
Cables & Wireless 5½ Pref.... ...	Stock	—	5½	77½	—11	7 2 0
do. A 7½ Ord.	,,	—	—	27½	—10	... ...
do. B Ord.	,,	—	—	12½	—5	... ...
Globe Tel. and T. Ord.	10	10	10	17½	—1½	*5 14 3
do. do. Pref.	10	6	6	11	—½	5 9 1
Great Northern Tel.	10	20	20	29	—	6 18 0
Marconi-Marine	1	12½	15	1⅞	+1/16	8 0 0
Oriental Telephone Ord.	1	12	12	55/-	—	*4 7 3

HOME AND FOREIGN TRAMS, &c.

Anglo-Arg. Trams First Pref. ...	5	5½	5½	2⅞	—1/16	11 5
do. do. 2nd Pref. ...	5	6	6	2⅞	—	12 6 2
do. do. 5% Deb. ...	Stock	5	5	65½	—2	7 12 8
British Electric Traction Def. Ord.	,,	5	5	1500	—	... ...
do. do. Pref. Ord.	,,	8	8	123½	—	6 6 6
Brazil Traction	100	7	8	40	—1	5 0 0
Brit. Columbia Elec. Rly. Pce. ...	Stock	5	5	99½	—	5 7 0
London & Sub. Trac. 5% Pref. ...	1	Nil	Nil	9/-	—	... ...
London United Tram Deb. ...	Stock	4	4	50½	—	7 18 4
Mexico Trams, 5% Bonds	—	5	5	63½	—4	7 17 6
Mexican Light Common	100	Nil	Nil	70½	—6	... ...
do. 7% Pref.	100	7	7	75½	—1	9 5 6
do. 1st Bonds	—	5	5	81	—	6 5 0
Victoria Falls Ord.	1	15	15	3⅞	+1/16	4 18 6
Yorkshire (West Riding)		Nil	Nil	5/-	—	... ...

MANUFACTURING COMPANIES.

Assoc. Elec. Ord.	1	6	6	23/9	—	5 1 1
Babcock & Wilcox	1	13	15	55/-	—	*5 9 1
British Aluminium Ord.	1	10	10	40/-	—	5 0 0
British Elec. Transformer Pref. ...	1	7	7	8/9	—	... ...
British Insulated Ord.	1	15	15	3⅜	—	4 0 0
Brush Ord.	Stock	10	10	120	—	8 6 8
Callenders	1	15	15	3⅛	—	4 4 0
do. 6½% Pref.	1	6½	6½	23/9	—	5 9 5
Crompton Parkinson Ord.	5/-	—	30	23/9	—2/-	6 6 4
do. 8% Pref.	1	8	8	25/9	+9d.	6 4 3
Edison-Swan 1st. Pref.	1	7½	7½	24/6	—	7 1 2
do. 5% Deb.	Stock	5	5	84½	—	5 18 4
Electric Construction	1	5½	5	12/-	—	8 6 8
Enfield Cable Ord.	1	20	20	4¼	—	4 14 1
English Electric	1	Nil	Nil	15/-	—3/9	... ...
do. do. Pref.	1	8	Nil	12/6	—	... ...
Gen. Elec. Pref.	1	6½	6½	23/6	—	5 10 7
do. Ord.	1	10	14	2½	+⅛	5 12 0
Henley	1	25	30	6	—¼	5 0 0
do. 4½% Pref.	5	4½	4½	4¼	—	5 6 0
India-Rubber	1	Nil	Nil	7/6	—1/8	... ...
Johnson & Phillips	1	10	10	1⅝	—	5 6 8
Siemens Ord.	1	7½	7½	21/3	—	7 1 2
Telegraph Construction	12	10	10	18½	—	*6 7 6

* Dividends paid free of Income Tax.

The World Power Conference.

The Second Plenary Meeting held at Berlin.

By OUR SPECIAL COMMISSIONER.

No. 3.*—*Continuation of extracts from, and comments on, selected papers of electrical interest submitted and discussed by delegates.*

Mr. A. Smirnov's paper on the "Growth of Electricity Supply in the Moscow Region over the years 1925-1929" describes the development of the 115-kV ring main surrounding the district. This main interconnects five generating stations, totalling 665,000 kW, including stand-by plant; of this total 150,000 kW is provided by the State power stations erected on the lignite deposits near Moscow. The author states that the cost of generation averages at 3.84 kopecks per kWh at the busbars and 6.87 at the consumers' terminals, but gives no information with respect to selling prices.

In Canada the average increase of water power developed over the years 1924-1929 amounted to 369,000 h.p. In 1934 a total of 7.5 million h.p. will be developed out of an estimated aggregate of 33 million h.p. A total length of 230 miles of 220-kV transmission line is in operation, and two other lines at the same pressure are being erected. The development of Canadian water power involves large capital outlay on account of the large variations in the amount of water flowing in the available rivers. Non-regulated river plants are used to carry base loads, whilst the stations of the regulated rivers are used to carry the peaks. An interesting feature of the paper is the use of electricity for steam-raising purposes.

Mr. L. W. Morrow's paper on "Power Costs and Trends in the U.S.A." indicates a reversal of the Canadian conditions: The tendency is to use higher steam pressures (*e.g.*, 1,200 lb. per sq. in.) at a continuously increasing rate. The author states that the cost of fuel generally decreases as the capacity of the power station increases, but it can be shown that a definite limit can be reached, beyond which no further reduction can be obtained. It is doubtful whether it is an economical proposition to increase stations beyond this limit, on account of the increasing difficulties in transmitting very large blocks of power and in overcoming disturbances due to atmospheric conditions.

The third day's meeting concluded with an "American Hour," during which a very interesting address was delivered by Mr. H. Foster Bain on "The Place of Minerals in a Power-controlled World."

The address is an historical survey of the sources of power from the time when only slave power existed up to the present dependance of the modern world on the minerals contained within the earth's crust. It describes how the whole of modern civilisation is built up upon the use of minerals, and how, as demand increases in certain sections, many of the more abundant types but little used become substituted for those whose economic production becomes more difficult.

During the "Hour" a sound film was exhibited, entitled "The Birth of the Incandescent Lamp" (Edison).

* For Nos. 1 and 2 of this series see ELECTRICAL REVIEW, June 27th and July 4th, 1930.

Festival Banquet.

The evening of June 18th was marked by a World Power Festival, organised by the German National Committee; it was of an eminently world-wide character and was a truly representative masterpiece of organisation. Not the least spectacular event of the evening was the sight of approximately 4,000 guests seated at a banquet at the Sportpalast. The nearest approximation to it would be a banquet at Olympia laid out for the Royal Tournament, the guests being seated in the different tiers and in half the arena. Apart from the magnificent rendering of German folk songs by the Berlin Glee Singers' Choir, the event of technical interest of the evening was the interchange of radio greetings with the National Electric Light Association, meeting in congress in San Francisco, U.S.A., a speech by Mr. T. A. Edison from his laboratory in Orange Park, a message by Lord Derby from London, and a speech by the Marchese G. Marconi from London. Return greetings and thanks were broadcast from Berlin by Dr. Köttgen, chairman of the Conference. The various speeches were publicly broadcast in the various countries interested, but it was impossible to broadcast them in England owing to Sir John Simon's talk on India coinciding in time with this event. During the course of the banquet many interesting tableaux were presented, showing the visitor many phases of German national life, including a procession of some 700 people in the various native German dresses. The evening's entertainment is not likely to be forgotten by the guests.

Large Power Plant.

The technical meetings continued in the Kroll Opera House by the reading of the general reporter's summary of the nine papers presented in Section 7 on the "Construction and Operation of Large Power Plant." The chair was taken by Mr. I. E. Moultrop (U.S.A.), who was particularly successful in dealing with the time limit imposed upon those taking part in the discussion. He pointed out that there was a long list of speakers and if they did not respect the red signal to stop, he, as chairman, was provided with a hammer, for which he could see no other use than the gentle enforcement of his decisions.

The majority of the papers presented can be divided into two classes: "Smoke-abatement Problems" and "Turbine Problems." Two of the three papers on "Smoke" were from England (Dr. S. L. Pearce and Dr. S. Lessing), whilst the third was from the U.S.A. (Mr. V. J. Azbe). The discussion showed, however, that smoke troubles are not confined to those two countries.

Dr. S. L. Pearce's paper deals with the tests carried out with a view to meeting the very strict regulations that have been laid down in connection with the new Battersea super station. The results of the tests appear to show that sulphurous acid can be eliminated in part by washing the flue gases in specially built towers. In the discussion that followed he stated that the time of contact of the flue gases with the cleaning surfaces should be from 23 to 44 seconds, and that the amount of metallic contact surface was based on 8,000 sq. ft. per ton of coal burned per hour. The cost of gas cleaning, allowing for the addition of alkali, would be 15 pence per ton of coal burnt, inclusive of capital and operative costs. In the

case of the Battersea station, he was of the opinion that the alkaline nature of the River Thames water would be sufficient to neutralise the acid in the washing water.

Dr. Lessing's paper deals with the cleaning of coal before firing, and is an economic study of the value of the method. The author gives examples of coal cleaning to illustrate the costs and claims that, in spite of the increased cost of fuel over raw coal, the economy of the method may be proved.

The third paper, by Mr. V. J. Azbe (U.S.A.), treats the subject as a whole, not only from the industrial coal nuisance point of view. The author's proposals for making the smoke regulations stricter will be read with interest. Tests that have been carried out show that the standard methods of firing boilers are unsatisfactory, particularly those of domestic boilers, for which rational designs and new firing methods have been evolved. The author proposes that the subject should be studied internationally, as no satisfactory methods exist for determining the dust content and general characteristics of smoke.

In the very short time at his disposal in the discussion, Mr. S. B. Donkin mentioned that gas observation was the only criterion, and also stated that he thought there was a necessity for the standardisation of results. A further contribution to the discussion by Mr. Pochobradsky described a method of dust extraction by the cyclone method, using asbestos bag filters. It had been shown that by this method 99 per cent. of the dust had been removed.

In connection with turbine practice, an interesting paper was presented by Mr. E. Brown (Switzerland), in which a method is described of maintaining a turbine at full working temperature with a very small steam consumption. The figures given in the paper refer to a 30,000-kW set and it is shown that the consumption of steam for maintaining temperature is reduced to about 3 per cent. of the no-load consumption.

Large Electrical Machines.

On the construction of large generators, transformers, and other electrical machines, Section 18, a total of 17 papers was presented; they could very easily have formed the object of a special conference on their own. In spite of the very able summing up of the papers as a whole by Dr. Kloss, the time left for discussion out of a total time of two and a quarter hours allocated to the entire section was necessarily exceedingly short. We cannot do better than briefly review the main points contained in Dr. Kloss's summary on the trend of development in recent years, which shows that in the case of three-phase synchronous machines the weight of modern generators is from 2.35 to 2.5 kg. per kVA with cast-iron housings and copper windings, whereas in that of the fabricated type of generator with welded housings the weight is reduced to 2.16 kg. per kVA. In the four-pole class the corresponding figure is approximately 2.16 kg. per kVA. The factors governing the limiting sizes of generators are briefly dealt with and Table I refers to some of the largest generators built and under construction for coupling to steam turbines.

TABLE I.—LARGE GENERATOR DATA.

No. of Poles.	Capacity kVA.	Speed.	Frequency.	Rotor Winding.	Installed.
2	72,000	3,000	50	Aluminium	—
4	100,000	1,500	50	Copper	Zschornewitz
4	160,000	1,500	50	Copper	New York Edison

Much attention is being paid to alloy steels for rotors; chromium-nickel steel has been tried with success, but the process requires a large amount of skill and care in order to remove residual strains, and several cases have occurred in which rotors have burst across a given diameter due to this cause. The residual strains may be eliminated by grooving the periphery of the rotor, though this has the disadvantage of introducing weakness and of reducing the peripheral speed. Metallurgists are endeavouring to produce an alloy with, for example, the addition of molybdenum, which will be able to stand the heat treatment more readily. In connection with end bells, reliable non-magnetic material with a very high yield point may be obtained. Stator losses are reduced by the use of alloys in stampings in which the loss is brought down to 1.7 watts per kilo.

In the case of modern machines the efficiency, although already extremely high, tends to reach even higher figures; 97.9 and 97.3 per cent. have been obtained with 45,000-kVA and 100,000-kVA machines, respectively, and according to information from America over 98 per cent. has recently been obtained.

A method has been devised of ventilating the stator in a radial direction, alternatively inwards and outwards, in order to make it independent of the core-length. Ventilation by means of hydrogen according to Anschutz and Schuler has been tried in America and has given promising results. It allows of a reduction in ventilating losses, but gives rise to difficulties with regard to shaft packing.

A tendency is shown to reduce the short-circuit ratio, which from 2.5 to 3 has been considerably lowered. Machines are being designed in America for a ratio of 1.25 to 0.8, whilst in Europe values even lower than 0.8 have been employed. Difficulties due to voltage variation, which is an outcome of the small short-circuit ratio, are met by the use of quick-acting voltage regulators, which are being developed and perfected simultaneously with alternator development.

In view of the increasing sizes of sets difficulties are arising in connection with the winding sections. A solution is sought by increasing the generating voltage of the machines, even so far as to do away with the intermediate transformer. This advantage is, however, offset by the extra risk of line surges penetrating into the end coils of the generators. According to the various authors, it is possible to look forward to further increases in size; capacities of 70,000 kVA at 3,000 r.p.m. may be expected with air cooling, whilst the introduction of hydrogen cooling might even increase the size to 90,000 kVA at 1,500 r.p.m.; capacities of from 225,000 to 250,000 kVA may be anticipated. Transportation difficulties will of course increase with the increasing size of machines, but it is suggested that they will be overcome by building up the stators on site.

Hydraulic Generators.

With regard to the tendencies in development, the same remarks apply as in the case of steam-driven sets, more particularly in connection with the increase of voltage, insulation, stability, choice of short-circuit ratio, efficiency, and cooling. In this case the increased voltages necessary for machines of larger outputs involve the further serious difficulty of voltage rise when the load is thrown off. Special de-excitation devices are required in conjunction with special design of the magnetic circuit in order to reduce the magnetic time constant to the lowest possible limit. With these devices it has been found possible to vary the voltage of the main exciter at the rate of 500 volts per second, which is ten times greater than the rate that can be obtained with normal exciters.

Limiting capacities do not appear to have been reached, but considerable variations in opinion were noted with regard to the estimated upper capacity, opinions varying from 50 to 100 per cent. in excess of the capacities of the largest machines in their own particular class yet built (see Table II).

TABLE II.—ESTIMATED LIMITING OUTPUT OF HYDRAULIC GENERATORS.

	Capacity, kVA.		
Speed, r.p.m.	Hunziger.	Newbury and Smith.	Niethammer.
1,000	20,000	7,000	30,000
750	30,000	13,000	40,000
600	40,000	23,000	50,000
500	60,000	33,000	60,000
375	80,000	48,000	80,000
300	100,000	60,000	100,000
250	over 100,000	—	—

South African Electrical Trade.

Import Figures for 1928 and 1929 Compared.

THE following statement, showing the imports of electrical and similar goods into the Union of South Africa during the year 1929, has been compiled from the recently-issued official trade statistics. The figures for 1928 are added for purposes of comparison, and notes of any increases or decreases are made.

	1928. £	1929. £	Inc. or dec. £
Electrical cable and wire—			
Total	569,000	771,000	+202,000
From Great Britain	509,000	680,000	+171,000
,, United States	6,300	6,700	+ 400
,, Germany	39,000	60,000	+ 21,000
,, Belgium	8,400	9,500	+ 1,100
,, Holland	3,700	11,000	+ 7,300
Heating and cooking apparatus—			
Total	118,000	133,000	+ 15,000
From Great Britain	38,000	44,000	+ 6,000
,, United States	18,000	24,000	+ 6,000
,, Germany	14,000	15,000	+ 1,000
,, Canada	44,000	46,000	+ 2,000
Meters, electric—			
Total	28,000	34,000	+ 6,000
From Great Britain	15,000	20,000	+ 5,000
,, Germany	8,000	8,600	+ 600
,, United States	600	600	—
,, Switzerland	2,800	2,100	- 700
Insulators (not porcelain)—			
Total	7,200	8,000	+ 800
From Great Britain	5,500	5,100	- 400
,, United States	1,100	800	- 300
,, Germany	500	400	- 100
Insulators (porcelain)—			
Total	6,500	10,800	+ 4,300
From Great Britain	3,300	5,400	+ 2,100
,, Germany	1,200	1,800	+ 600
,, United States	1,400	2,000	+ 600
Electrical material, other—			
Total	73,000	55,000	- 18,000
From Great Britain	23,000	18,000	- 5,000
,, United States	9,700	11,000	+ 1,300
,, Germany	8,000	7,300	- 700
,, Italy	5,600	2,800	- 2,800
,, France	800	700	- 100
,, Sweden	23,000	13,000	- 10,000
Electric hand lamps—			
Total	21,000	28,000	+ 7,000
From Great Britain	2,100	2,200	+ 100
,, Germany	4,300	6,100	+ 1,800
,, United States	14,000	19,000	+ 5,000
Other electric lamps, globes, &c.—			
Total	132,000	168,000	+ 36,000
From Great Britain	50,000	72,000	+ 22,000
,, Austria	10,000	14,000	+ 4,000
,, Germany	19,000	19,000	—
,, Holland	32,000	32,000	—
,, United States	11,000	11,000	—
,, Hungary	5,500	6,700	+ 1,200
Electric lighting outfits, self-contained—			
Total	24,000	39,000	+ 15,000
From Great Britain	7,000	15,000	+ 8,000
,, United States	14,500	21,000	+ 6,500
Wireless apparatus and parts—			
Total	84,000	175,000	+ 91,000
From Great Britain	60,000	56,000	- 4,000
,, United States	13,000	26,000	+ 13,000
,, Germany	6,300	22,000	+ 15,700
,, Holland	1,200	71,000	+ 69,800
Telegraph and telephone material—			
Total	52,000	58,000	+ 6,000
From Great Britain	30,000	31,000	+ 1,000
,, Sweden	7,000	5,300	- 1,700
,, United States	6,300	3,800	- 2,500
,, Germany	4,000	14,000	+ 10,000
,, Belgium	4,000	1,000	- 3,000
Batteries, primary—			
Total	115,000	199,000	+ 84,000
From Great Britain	24,000	35,000	+ 11,000
,, United States	78,000	135,000	+ 57,000
,, Germany	7,000	14,000	+ 7,000
,, Denmark	5,500	5,200	- 300
,, France	—	5,900	+ 5,900
Batteries, secondary—			
Total	82,000	75,000	- 7,000
From Great Britain	21,000	23,000	+ 2,000
,, United States	50,000	38,000	- 12,000
,, Germany	7,600	8,600	+ 1,000
,, France	—	3,000	+ 3,000
Motors—			
Total	138,000	182,000	+ 44,000
From Great Britain	82,000	105,000	+ 23,000
,, United States	20,000	28,000	+ 8,000
,, Germany	18,000	20,000	+ 2,000
,, Holland	7,000	3,900	- 3,100
,, Sweden	2,900	10,000	+ 7,100
,, Denmark	4,300	5,300	+ 1,000
Transformers—			
Total	106,000	123,000	+ 17,000
From Great Britain	72,000	82,000	+ 10,000
,, United States	15,000	16,000	+ 1,000
,, Germany	9,000	13,000	+ 4,000
,, Holland	1,800	3,600	+ 1,800
Dynamos and generators—			
Total	67,000	53,000	- 14,000
From Great Britain	58,000	45,000	- 13,000
,, Germany	3,100	2,900	- 200
,, United States	5,000	3,500	- 1,500
Electrical machinery, other—			
Total	877,000	981,000	+104,000
From Great Britain	655,000	719,000	+ 64,000
,, United States	109,000	115,000	+ 6,000
,, Germany	89,000	103,000	+ 14,000
,, Sweden	7,000	12,000	+ 5,000
,, Canada	1,000	500	- 500
,, Holland	4,000	8,000	+ 4,000
,, Switzerland	5,000	7,700	+ 2,700
Engines, oil, petrol and spirit—			
Total	139,000	129,000	- 10,000
From Great Britain	97,000	89,000	- 8,000
,, United States	28,000	17,000	- 11,000
,, Germany	11,500	14,600	+ 3,100
,, Canada	1,000	2,000	+ 1,000
Engines, steam and gas—			
Total	82,000	49,000	- 33,000
From Great Britain	76,000	46,000	- 30,000
,, United States	3,800	2,800	- 1,000

In addition to the above the following goods were imported as "Government stores":—

Batteries, primary—			
Total	4,900	6,500	+ 1,600
From Great Britain	400	1,200	+ 800
,, Germany	200	—	- 200
,, Denmark	3,000	2,700	- 300
,, Sweden	800	2,000	+ 1,200
Batteries, secondary—			
Total	6,900	400	- 6,500
From Great Britain	3,300	400	- 2,900
,, Belgium	3,600	—	- 3,600
Heating and cooking apparatus—			
From Great Britain	60	1	- 59
,, United States	620	3	- 617
Insulators (not porcelain)—			
Total (mainly from Great Britain)	380	240	- 140

	1928	1929.	Inc. or dec.
Insulators (porcelain)—	£	£	£
Total (mainly from Great Britain)	900	1,800	+ 900
Motors and parts—			
Total (mainly from Great Britain)	670	350	– 320
Dynamos and generators—			
Total (mainly from Great Britain)	200	120	– 80
Transformers—			
Total			
All from Great Britain ...	1,800	—	– 1,800
Electrical cable and wire—			
Total	39,000	45,000	+ 6,000
From Great Britain ...	9,700	29,000	+ 19,300
,, Denmark	500	100	– 400
,, Germany	24,000	5,000	– 19,000

	1928.	1929.	Inc. or dec.
Electrical machinery, other—	£	£	£
Total	31,000	28,000	– 3,000
From Great Britain ...	25,000	25,000	—
,, United States ...	200	300	+ 100
Wireless material—			
Total	2,500	300	– 2,200
From Great Britain ...	2,300	150	– 2,150
,, Sweden	100	—	– 100
Other telegraph and telephone material—			
Total	109,000	120,000	+ 11,000
From Great Britain ...	65,000	97,000	+ 32,000
,, United States ...	500	200	– 300
,, Sweden	23,000	16,000	– 7,000
,, Germany	11,000	3,000	– 8,000
Electrical lamps and lampware –			
Total (nearly all from Great Britain)	3,100	90	– 3,010

Swedish Industry and Trade.

Market Conditions and Possibilities.

MR. W. J. GLENNY, Commercial Counsellor at the British Legation, Stockholm, deals with economic conditions in Sweden in a report recently published by the Stationery Office for the Department of Overseas Trade (1s. 6d. net). A "Statistical Summary" which prefaces the report shows that Sweden has an area of 173,150 sq. miles (three times that of England and Wales) and a population of only 6,120,000. The English and German languages are widely used commercially. Some useful information for travellers is also given in the report.

Mr. Glenny says that after a difficult period, arising out of prolonged labour disputes in the earlier part of 1928, an improvement set in and continued well into 1929. There was, however, a slackening in the later months of last year. The country's position is sound, for it depends only to a very small extent on the luxury trades, which are the first to feel the effects of depression. British traders can still regard Sweden as a good, though limited, market for most kinds of high-class products for general consumption and for many articles for use in factories. It is interesting to learn that while only about 50 per cent. of Swedish dwellings have an internal water supply, practically all of them have electric light. The lower cost of living in rural areas has led to a considerable decentralisation of industry; the general standard of living is high in Sweden and greater attention is paid to the quality of goods than to the price.

Referring to the country's rapid industrial progress, the author says that as soon as an industry has attained a certain size in Sweden it becomes more economic to transfer manufacture to other countries, and most of the larger manufacturing concerns, such as the Match Trust and the L.M. Ericsson concern, all have international manufacturing interests.

The Engineering Industry.

In the Swedish mechanical engineering trades conditions, though on the whole satisfactory, varied considerably throughout the different sections during 1929. Although the agricultural and dairying machinery branches were depressed, the electrical engineering industry reported very satisfactory conditions generally, and employment was much better than in 1928. The exports of telegraph and telephone appliances, practically a monopoly in the hands of the L.M. Ericsson concern, was about the same in 1929 as in 1928, but the manufacturing interests of the company in other countries, and its operation of telephone concessions, continued to develop.

It is interesting to observe that the Swedish exports to Great Britain of articles in the class "machinery, instruments, &c.," generally are not greatly in excess of the imports. Sweden's exports of electrical machinery and appliances, however, were more than twice the imports of this class in 1927 and 1928. Among the items in this trade during 1928 was special electro-technical apparatus (Röntgen, radio, &c.) of which Great Britain was responsible for 1.5 million kr. (£1=about 18 kr.) and Germany for 5 millions. Germany's supplies of generators, meters, incandescent lamps, and accumulators exceeded the supplies from Great Britain. The German training of many Swedish engineers and industrialists naturally creates a bias in favour of German apparatus, but in some lines Great Britain holds its own, and many special devices for factory and shipbuilding use find a good market.

Water-Power Development.

The report says that water-power now furnishes probably about three-quarters of the mechanical energy used for all purposes in Sweden. In 1928 the output of Swedish hydro-electric works was 4,410 million kWh and it is estimated that last year's production was 4,850 million kWh. The increase was largely a consequence of the establishment of new works and the extension of existing plant. The 1928 figure was affected by labour disputes. The State is the largest individual producer of hydro-electric power in Sweden; the gross receipts for 1930 are estimated at kr. 27 millions and working expenses at kr. 12 millions; about kr. 9 millions is to be spent on capital account in the Budget year 1930-31. Of the total in 1928 the State works produced 1,541 million kWh and local authorities 346 million kWh. The electro-chemical and "electro-thermic" industries took 891 millions; other large industries 2,270 millions; lighting, small industries, agriculture, &c., 490 millions; and railways and tramways 177 millions.

Agents and Advertising.

In one of the appendices to the report the appointment of agents in Sweden is dealt with at some length. It is said that, in general, foreigners are debarred by Swedish law from setting up business in Sweden; there is also strong propaganda in Sweden against the purchase of foreign goods from non-Swedish agents. It seems therefore that the agent should be a Swede and in this direction the Department of Overseas Trade can be of assistance. There is not a great deal of room for newcomers in the staple lines of trade and competition is very keen, but there is an opening for "novelties." It is suggested that if a British firm decides to enter the Swedish market it should write to the D.O.T. asking about possibilities and indicating the lines on which it would desire to arrange representation in the country. Then, if the Department has no information available, it will ask its Swedish representatives for a report which will generally comprise a short description of market possibilities, and will give the names of agents who express interest in an agency of the kind in question. At the same time a personal visit, although it may be expensive, is considered the best way of proceeding.

With regard to advertising, it is stated that the Press is widely used and can be recommended to United Kingdom firms provided they have first convinced themselves that the potentialities of the market are such as to justify the outlay. Illustration is much used in Swedish advertising but the poster is comparatively little used.

New Electrical Devices, Fittings, and Plant.

Readers are invited to submit particulars of new or improved devices and apparatus for publication in this section.

X-Ray Pearl-testing Equipment.

During the International Jewellers' Congress in London recently a new instrument for testing spurious pearls and precious stones aroused much interest amongst the delegates. The instrument, which consists essentially of a special "Metalix" X-ray tube mounted on adjustable legs, was

Fig. 1.—"Metalix" Pearl-testing Equipment with Photographic Attachment.

elaborated by Mr. Jacob Vos, one of the leading Dutch jewellers, in conjunction with Philips Lamps, Ltd. The apparatus reveals immediately, it is claimed, whether a precious stone is genuine or a pearl cultured. It is not necessary to pierce or even unstring the pearls. Visual fluoroscopic examinations may be supplemented by radiograms, providing a permanent record of the test. The apparatus is a practical application of the theory of crystal analysis by X-rays, of which von Laue is the discoverer. It is very compact, and its cost is said to be small compared with its utility. When the X-ray beam penetrates a genuine pearl, a characteristic hexagonal figure is secured on the photographic film, entirely different from the image projected by a cultured or imitation pearl. Every precious and semi-precious stone similarly yields a characteristic image. Fig. 1 shows pearl-testing apparatus equipped with a photographic attachment. The equipment is marketed by PHILIPS LAMPS, LTD., X-ray Department, 145, Charing Cross Road.

A Traffic-control System.

A recent development of REVO ELECTRIC CO., LTD., Britannia Works, Tividale, Tipton, is the "Electric Robot" system of traffic-control signals for pole or pillar mounting. The system employs variable timing to suit the differing conditions of traffic, and its operation is entirely automatic, although it can be hand operated should very special conditions require it. The apparatus is robustly made with a cast-aluminium body, 8-in. prismatic lenses, and chromium-plated parabolic reflectors. The operating gear is simple and is enclosed in a damp-proof case. The equipment is available in three types, two-way and three-way for corner mounting, and four way for central or island positions. The mechanism for automatically operating the signals is driven by a small a.c. or d.c. motor, which drives two disks operating the switch mechanism for changing the various signals. Adjustment of the cycle of time is made by means of a speed control knob calibrated to provide varying lengths of the total cycle. The ratio of 25 per cent. to 75 per cent. of red or green can be adjusted in either direction by the movement of a toggle lever attached to the front disk. The switch mechanism has a positive quick make and break action, and is not affected by vibration or atmospheric conditions. As recommended by the Ministry of Transport, the amber light overlaps the red light on the change being made from red to green, but is visible alone when the change is being made from green to red. The period of time for the amber light can be adjusted. In situations where it is undesirable to keep the signals changing during the night, the amber can be made to show continuously by a turn of the switch knob, which automatically cuts out the driving mechanism.

Sheet-steel Distribution Pillars.

It is apparent that in the design of the new sheet-steel distribution pillars of Messrs. W. T. HENLEY'S TELEGRAPH WORKS CO., LTD., Holborn Viaduct, E.C.1, there has been co-operation between draughtsman and artist. The pillar is also claimed to be a sound proposition from the point of view of mechanical strength. Pillars required for use in sub-stations or for industrial equipment are provided with cast-iron plinths, whilst for outdoor distribution systems cast-iron roots are supplied.

The doors and sides are one-piece sheet-steel pressings, and the root, plinth, sides and roof are rigidly fixed by four ¾-in. mild-steel tie-rods which pass through each corner. The tie-rods act also as hinge pins for the door hinges. The structure is further strengthened by angle-irons fixed along the tops of the door openings, which also form seatings for the doors.

When the door openings exceed 25 in. in width double doors are supplied back and front. The inside panels of the doors are painted white for recording details of circuits. The locks are triple action bolt locks made of brass pressings, which operate steels rods passing to the top and bottom of the door and so locking the door at three points. Standard "Henley" units are supported on mild-steel straps, the top one being attached to the cast-iron sides of the roof, and the lower one to the cast-iron plinth.

Doors are provided both back and front, and when the door openings exceed 25 in. in width double doors are provided both back and front. Openings are formed at the top and bottom of the pillar which provide ample ventilation, and these are so arranged that wires and sticks cannot be poked through them. The c.i. roots for outdoor installation are protected against corrosive action by black bitumastic paint, and the interiors of all pillars are painted with metallic aluminium paint, which provides a rust and corrosion-resisting coating. The silver-grey colour is an advantage in diffusing light inside the pillar, thus facilitating inspection and assembly. Fig. 2 depicts the construction of a double-door pillar.

Fig. 2.—A "Henley" Sheet-steel Distribution Pillar.

The final exterior finish is the standard "Henley" green.

The Dniepr Hydro-electric Station.

A general account of a scheme for utilising the water resources for generating electricity and at the same time improving the navigation of the River Dniepr.

(COMMUNICATED.)

THE Dniepr hydro-electric station, the construction of which was begun in 1927, is the largest in Europe, and one of the largest in the world; its capacity when completed will be 850,000 h.p. The concrete dam will contain one million cubic metres of concrete and is said to be the largest masonry dam in the world. The construction of the power station, dam, and auxiliary structures will cost more than £2,000,000, and has necessitated the transfer of peasants from a territory of approximately 100,000 acres to other districts. Colonel Hugh L. Cooper, the well-known American hydro-electric engineer, is consulting engineer on the project. A staff of engineers of the Cooper organisation is employed permanently on the construction, and Mr. A. V. Winter is acting as the chief engineer of the construction bureau. In addition the German Siemens-Bau Union is also furnishing technical assistance in the design and construction.

The scheme consists not merely in the construction of a large hydro-electric station, but connected with it is also the establishment of a shipping service. The construction of locks and the raising of the water level of the Dniepr River will make the river continuously navigable over its entire length of 1,500 miles. The scheme provides also for the construction of several railways, the most important of which will be one between Demurino and Marganets, which will provide a new link between Russia and the Near-East.

The provision of a cheap supply of electricity and transport facilities will inevitably create a favourable position for the building of new factories and works. The River Dniepr project is to become the centre of great industrial development in the Ukraine, including factories to produce fertilisers, aluminium, ferro-manganese, carbide and other products, a large steel mill, a copper smelter, and many other industrial enterprises. The construction of some of these factories has already been started, and they are to start work at the same time as the station.

When completed in December, 1932, the station is expected to have in operation plant aggregating 500,000 h.p., out of the total ultimate plant capacity of 850,000 h.p. A large part of the equipment used in the station and construction work has been purchased in the United States. The four hydro-electric generators, which are being manufactured at the Schenectady works of the American General Electric Co., are of 100,000 h.p. each; they are the largest hydro-electric generators ever constructed. The largest hydraulic turbines and generators now working in the United States are of 70,000 h.p. at the Niagara Falls; 54,000 h.p. at Conowingo; and 35,000 h.p. at Muscle Shoals.

The speed at which the 100,000-h.p. generators will be operated is not available, but from data presented by various authorities before the recent World Power Conference it would appear that in any case their capacity approaches the limits practicable under present methods of construction.

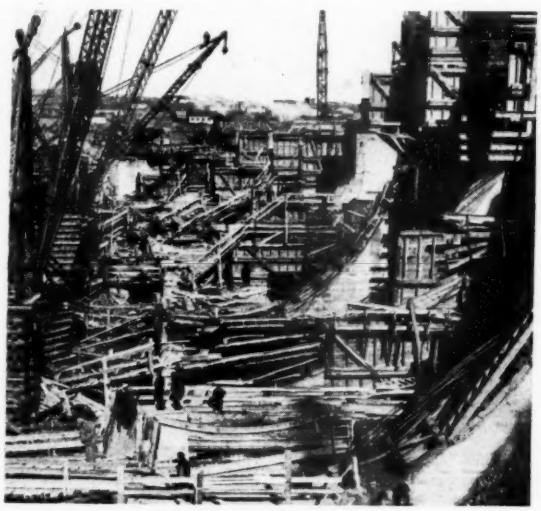


Fig. 1.—Construction of Dam on Left Bank.

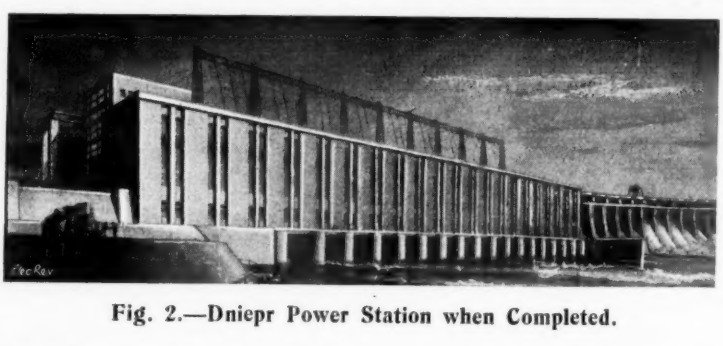


Fig. 2.—Dniepr Power Station when Completed.

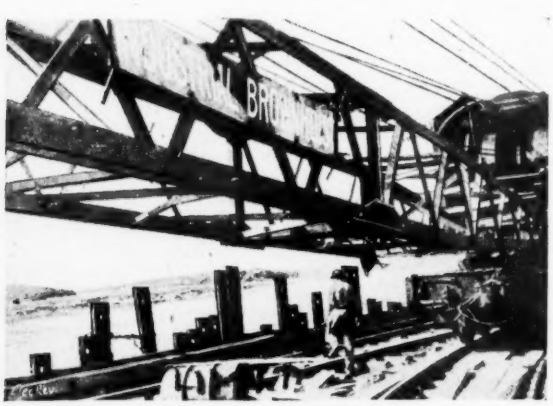


Fig. 3.—Partly Completed Dam.

Conductor Surface and Corona Loss.

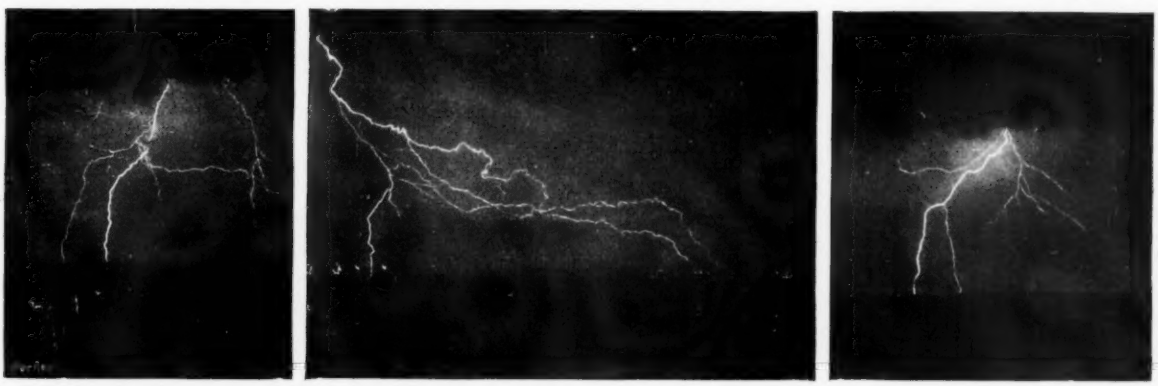
Preliminary research on 700-ft. sections of three-phase lines using various types of conductors has been undertaken by the Pacific Gas and Electric Co. in connection with a 114-mile, 220-kV, two-circuit transmission line. It is stated in the *Electrical World* that tests have indicated that the condition of the surface of the conductors has a very marked effect upon corona loss. Weathering or oxidising of the surface causes a very marked increase in corona loss at 220,000 volts, the ratio of loss between a new bright conductor and one that has aged a week or more being about 1 to 4. The presence of grease and dirt influences results also. Grease decreases corona loss, while dirt increases it. The tarnished surfaces which occur on conductors within a few days after being erected makes them more sensitive to atmospheric humidity. The size of strands and arrangement of the strands—that is, concentric vs. rope lay—has a pronounced effect. For equal surface conditions there seems to be no appreciable difference between copper and aluminium conductors of the same diameter.

Lightning Phenomena.

The traditional vagary of the English climate lends interest to the accompanying illustrations and correspondents' comments thereon.

THE weather medley of the last few months in South-Eastern England and other parts of the British Isles, together with the arrival of the thunderstorm season, render the photographs reproduced below topical subjects of conjectural discussion.

Mr. John W. Sugden writes from Sale, in Cheshire, to explain that those reproduced as figs. 1, 2 and 3 were taken about five years ago whilst he was living on Walney Island, Barrow-in-Furness, at midnight from a bedroom window overlooking open fields and Walney Channel towards Messrs. Vickers' shipyard, which is faintly visible in the background. He points out that, in addition to the main lightning flash visible, a secondary discharge can be seen in the foreground stretching well into the clouds (fig. 2) which is of special interest. The three negatives show that the secondary flash was not "faked." The white dots directly beneath the shipyard tower cranes (figs. 2 and 3) are the lamps on the dock side; they had been put out of action when the first negative was exposed.



Figs. 1, 2 and 3.—Main and Secondary Lightning Discharges at Barrow-in-Furness.

Mr. W. G. Mitchell (Darlington) points out that whilst on holiday at Haworth, near Keighley, in Yorkshire, he tried to obtain a picture of a village fair after dark when the "round-a-bouts," swinging boats, &c., were illuminated. On development, he found that the film had recorded some electrical disturbance which appears to be unusual (fig. 4).

The "Kodak" camera used was supported on a tripod, F.16 "stop," and the exposure of 1.5 minutes was divided, *viz.*, the "round-a-bouts" were at a stand-still when the lens was uncapped; at the end of one minute's exposure they started to revolve, so the shutter was dropped until they were motionless again, when a further 0.5 minute exposure was made. The clean definition of the distant landscape can hardly be accounted for by the illumination from the arc lamps at the fair, but it must be remembered that there is often sufficient light on a summer evening at the time mentioned for an exposure of the length stated to be effective with a rapid film.

The photograph was taken from an elevated position a short distance from the historical parsonage that was at one time the home of the Brönte family, and is now the Brönte Museum. A "Kodak" camera and "Ilford" film were used, the 1.5 minutes exposure having been made at 10.30 p.m. during a heavy shower of rain. The following are the comments of a very well-known scientist:—

"Two electrical effects are illustrated, distinct from each other in the main, *viz.*, brush discharge and summer lightning. There evidently existed at the time a very high state of electric strain between the village and a region behind the place from which the photograph was taken. Following a very hot day, heated air from the ground had risen and may have formed a layer with a surface of varying density. Five flashes appear to pass out of the picture near the right-hand bottom corner. Four of them can be traced back to a point behind the right-hand arc lamp. At the far end the five flashes are contorted in a remarkable manner, but we know of instances of a lightning flash having very much the same character. We take it that the flashes have taken place along a surface of hot and cold air, the curves in the flashes corresponding to variations of the surface in height above the ground. I do not think the presence of raindrops would greatly affect matters, as they would be at right angles to the flashes. The flashes were probably simultaneous.

"The appearance of the arc lamps is due mainly to irradiation superimposed upon which is brush discharge (St. Elmo's fire) produced by intensely electrified air."

Mr. A. N. C. Horne (Queenstown, Ireland) made the photographic print reproduced as fig. 5. He took it during a thunderstorm in Johannesburg, South Africa, a few months ago; to the right the clock tower of the general post office is visible, while between it and the lightning flash the dome of the City Hall tower may be seen. The feature of the record is that it indicates how the ultra-red light stands out black against the sky, while both the primary and secondary flashes are clearly shown. The storm during which the photograph was taken lasted for over six hours, did considerable damage to property, and killed much cattle.

Fig. 4.—A "Village Fair."

Fig. 5.—A South African Storm.

Selected Radio-telephone Apparatus.

Brief descriptive details of useful devices and accessories available to broadcast listeners as aids to reception and better reproduction.

THE production of a radio-telephone cone loud-speaker capable of faithful reproduction over the whole frequency spectrum of, say, 50 to 6,000 cycles at a price that would not be disproportionately high relatively to the cost of the receiving set is not simple. The combination of two, or more, such instruments, each specially designed for a particular frequency band, would seem to be the obvious way of obtaining a uniform response throughout, but, unless such combination is very carefully achieved with respect to both capacity and resistance, the union may prove to be antagonistic rather than assistant.

A Double-cone Chassis.

Some three months ago reference was made to a speaker designed on the lines indicated above,* and the STANDARD BATTERY Co. (incorporating the Shaftesbury Radio Co.) has now sent us a sample of its latest product. It is a 20-in. chassis, the largest of the series made; as before, it is fitted with a universal bracket for the accommodation of almost any of the available makes of driving unit, and screws, nuts, washers, and an extension piece are provided to facilitate fixing. The larger cone responds to the lower frequencies and the smaller to the higher ones; they are made of a special kind of paper and the method of bending it into shape is claimed to be novel. While the earlier model has functioned well, the new larger instrument should, if anything, be better than its smaller brother.

A Push-button Switch.

To the variety of non-reversible metal and all-bakelite plug connectors and switches for radio circuits marketed by A. P. LUNDBERG & SONS, LTD., has recently been added the Q.M.B. push-button switch. Fig. 1 illustrates the interior construction of the single-way "push on" type, which has a quick-make and quick-break action. It is also made in "push off," two-way, double-pole and double-pole change-over patterns; in pendant form, and in tumbler, push and pull, double-push and turn-button actions for definite on and off positions.

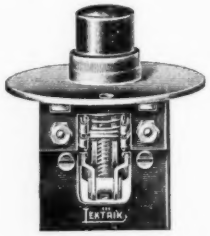


Fig. 1.—A Push-button Switch.

A Gas Fuse.

Recognising the fact that, apart from thunderstorms, other atmospheric conditions (such as rain and hailstorms) are liable to electrically charge aerials, Messrs. PHILIPS LAMPS, LTD., are marketing an uncommon form of protective fuse, or discharger. It consists of a glass tube containing a rare gas that ordinarily acts as an insulator; however, should the aerial collect a charge of 180 V or more (*i.e.*, the "striking" voltage of the gas) it will be immediately by-passed to earth, accompanied by an orange-coloured glow in the tube. When the voltage drops to the "extinguishing limit" (100 V) the gas ceases to function and becomes an insulator again. As an additional precaution the fuse tube contains a serrated-edge copper spark gap across which an unusually large voltage surge may jump to earth. The whole is surmounted with a watertight porcelain cowl and a wall bracket is provided for convenience of fixing.

Rubber-covered "Flex."

A new range of flexible cord connectors which is being introduced by Messrs. MCLEOD & MCLEOD for the forthcoming season is very attractive. Of good appearance and of similar diameter to ordinary "flex," the feature of the new product is that it is insulated with coloured rubber only; whilst the elimination of the usual cotton braiding makes the new variety cheaper, the quality of the samples sent us is high. The nine distinct colours at present available are said to be quite fast, and not to fade on exposure to light.

Recent Valves.

Quite a crop of new types of thermionic valves has been announced within the last few weeks amongst others of the "Osram," Marconi, Cossor, and Mullard makes. Prominent amongst them are "super" power and a.c. mains-fed types, including indirectly-heated screen-grid valves possessing very great amplification factors. Anode voltages are on the increase; for instance, the PM.24B has a maximum grid voltage of 400 V, and a maximum auxiliary grid voltage of 300 V, which figures render it suitable for the large a.c. output required for radio-gramophone, public-address amplifiers, and similar apparatus, particularly that for driving moving-coil speakers. Mention of such high-power pentodes serves as a reminder that the insulation of the output circuits of any apparatus in which such valves are used should be beyond reproach, as peak voltages as high as 3,000 volts may be generated. For this reason also the speaker should never be disconnected from the choke-capacity or transformer output circuit, as the increased anode impedance would result in increased peak voltage which would almost certainly cause a breakdown in the winding of the choke or transformer, or between the winding and the core, and possibly crack the foot of the valve in addition.

* ELEC. REV., March 28th, 1930, p. 610.

A Moving-coil Speaker.

One of the latest additions to the radio products of the GENERAL ELECTRIC CO., LTD., is a moving-coil loud-speaker, of which the suspension device and speech coil former are machined from one piece of duralumin. The machining throughout is to fine limits, which enables an extremely small gap to be employed between the field magnets and the coil. Only ten watts are required to energise the field magnets to a high magnetic flux density. The framework of the diaphragm is made of aluminium, so that while it is comparatively light it is rigid, and it is firmly clamped to the pot to support the cone at its periphery. The impregnated-paper cone is suspended by very flexible calf skin, with a generous rim of felt at the diaphragm edge where it makes contact with a baffle. In the case of the a.c. model a rectifying unit forms part of the chassis, and is surmounted by a valve-holder carrying an "Osram" U.5 full-wave rectifier suitable for use on mains of 200/260 volts and a frequency between 50 and 80 cycles, and clearly marked terminals, with an ebonite safety cover, conduce to correct connection to the mains. An input transformer is incorporated, primary centre-tapped, permitting a choice to be made of two impedances to match the output valve of the set to which it is connected and rendering the use of an extra intermediary transformer unnecessary when employed in conjunction with a pull-push amplifier. Furthermore, this transformer permits the loud speaker to be used direct in the anode circuit of the output valve in any type of set, or with a choke condenser output filter, a provision which makes for safety as well as contributing to general efficiency. Both the a.c. and d.c. "Gecophone" moving-coil speakers are available in chassis form only.

A Useful Wall Jack.

Amongst the extensive range of accessories made by A. F BULGIN & Co., is the neat and well made "Junior" wall jack and plug. It should be very useful for radio house-wiring extensions, when remote control is required, and in hospitals and institutions wherein multi-listening points are needed. The plug, being of the telephone type and fitting into a single socket, is quite different in design to the common two-pin plug and socket, thereby avoiding the risk of plugging a loud-speaker or headphones into a power or lighting socket.

Electrolytic Condensers.

Whilst the TELEGRAPH CONDENSER CO., LTD., is too well known to need any introduction, no excuse is needed for drawing attention to an interesting application of one of its products as illustrated graphically by the two oscillograms reproduced below. Fig. 2A (top) is a record of the voltage applied to the

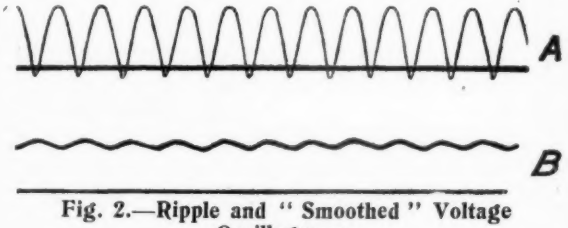


Fig. 2.—Ripple and "Smoothed" Voltage Oscillograms.

field windings of a moving-coil loud-speaker energised from a.c. mains by means of a transformer and metal rectifier alone, while fig. 2B (bottom), is a record of the same voltage when a 2,000-mfd. electrolytic condenser is connected in parallel with the speaker's field windings. They are visible proof of the suppression of that annoying mains' ripple which is apt to be too-prevalently audible in reproduction.

Legal.

Charges Against Former Plymouth Tramway Manager Dismissed.

MAGISTRATES at Plymouth were engaged throughout practically the whole of last week in investigating 21 charges of larceny, one of fraudulent conversion and two of falsification of accounts brought against Mr. H. P. Stokes, the former manager and engineer of the Plymouth Corporation tramways and transport undertaking. The theft charges concerned a variety of articles such as petrol, motor car tyres, bus doors, glass, wallpaper, &c., and the falsification of accounts charges related to allegations that defendant had employed Corporation workmen on work of a private nature.

Mr. G. D. ROBERTS, for the prosecution, stated that the case grouped itself under the following separate headings: (1) Larceny of petrol; (2) larceny of all kinds of articles connected with defendant's private motor car; (3) larceny of articles which defendant required for his own private residence; (4) larceny of material which defendant required for his seaside bungalow; (5) falsification of the time sheets and wages sheets of a large number of Corporation employés while their time and labour was being expended for the defendant's benefit; and (6) alleged conversion of £171 worth of tools, the property of the Corporation.

At the outset defendant's principal Counsel, Mr. COMYNS CARR, K.C., raised a formal objection that the summonses did not disclose the person by whom the information had been laid, and that two of the summonses were irregular and included what might be termed an unlimited number of offences in each summons.

The first witness called by the prosecution was the city treasurer, Mr. H. J. Hoare, who was submitted to a close cross-examination by defendant's counsel with regard to the method of requisitioning stores, Mr. Comyns Carr seeking to show that no order from defendant was ever referred back on account of irregularity. In one of his replies the city treasurer disclosed the fact that hundreds of thousands of documents had been searched in order to support the charges against the accused. Evidence was given by a committee clerk regarding the minutes of the Tramways Committee, defendant's counsel drawing the magistrates' attention to one which read: "The Committee investigated certain statements as to the management of the tramways department. After interviewing certain members of the staff the Committee was satisfied there was no foundation for those statements." The witness admitted that the resolution which was printed and signed by the chairman of the Tramways Committee was an amended one which read: "Resolved that the Council be informed that in the opinion of this Committee the matter calls for no further action."

The case for the prosecution with regard to alleged thefts of quantities of petrol was that Mr. Stokes used Corporation petrol for his motor car for his own private use, but the contention of the defence was that the arrangements made were that he should provide the car, pay for the licence and the insurance and that the department should provide the petrol and maintenance. A Corporation employé who had acted as defendant's driver stated in evidence that those on the Council who had any business connected with the tramways were driven in the car, and he said he supposed he had driven practically every councillor at one time or another.

Mr. COMYNS CARR submitted that there was no case on which a jury would be likely to convict. He said that there had been a delay of seven months before Mr. Stokes received an official notification that criminal proceedings were to be taken against him, and that he had not been left much time to prepare his case.

Without calling for evidence from the defence the magistrates on July 5th, the fifth day of the hearing, dismissed all the charges.

The presiding magistrate, Dr. Corbett, said it was common knowledge that many of the perquisites that Mr. Stokes was alleged to have succeeded in obtaining for himself were allowed, expressly or tacitly, to the heads of large commercial undertakings. Another matter was that Mr. Stokes made no attempt to make any secret whatever of what he was doing, or what was being done on his behalf. The magistrates were satisfied beyond doubt that Mr. Stokes considered he had a right to the upkeep and maintenance of his car, and the service of a Corporation employé as driver, and the criminal charges in relation to those matters therefore failed. With reference to the work done at Mr. Stokes's residence, that was Corporation property, and if Mr. Stokes was under any liability at all that liability was of a civil nature. They could find no evidence in support of the charge of fraudulent conversion, it appearing that the tools and other articles which Mr. Stokes was charged with having fraudulently taken were, according to prosecution's own witness, precisely where they ought to be according to the custom of the trade, namely, in the hands of the manufacturer. With regard to the remaining charges, which were of considerably less gravity, they were satisfied that the evidence did not justify their committing Mr. Stokes for trial.

Mr. ROBERTS said that although that was a matter which did not concern that Court, he thought he ought to mention that the depositions and the exhibits would probably be laid before the Attorney-General for his consideration.

A "Bosch" Magneto Trade-mark.

IN the Chancery Division recently Mr. Justice Maugham had before him an action by the Robert Bosch A.G., Stuttgart, against R. H. Cook & Co., of West Hendon, N.W., for injunctions restraining the sale under the description "Bosch magneto" or any similar description, of magnetos not of the plaintiffs' make, in alleged breach of an undertaking embodied in an agreement dated August 24th, 1925; and restraining the defendants from passing-off as "Bosch" magnetos machines not made by the plaintiffs, and for the delivery up of magnetos, price lists and advertising matter which contravened the undertaking.

The defendants denied that the designations which they used distinguished the plaintiffs' goods and counterclaimed to have the agreement set aside on the ground that their signature to it was obtained by misrepresentation, and for the return of the £25 which they had paid.

Mr. BRAY, for the plaintiffs, said that after the war broke out an American company was formed under the title "American Bosch Magneto Corporation," whose goods were sold in this country as "Bosch magnetos." In 1922 the plaintiffs obtained registration in this country of the word "Bosch" as a trade mark, but there was an appeal against this decision to Mr. Justice Astbury which was allowed. Proceedings, however, were successfully taken by the plaintiffs in a number of cases where magnetos fraudulently marked "Bosch" had been sold, and the defendants were one of the firms who signed the undertaking now sued upon. He contended that the description "Bosch" or any of the variations of it which he had mentioned meant the goods of the plaintiff company.

Mr. K. E. SHELLEY, for the defendants, said that "Bosch" magnetos were made by more than two companies and that any article sold by these could properly be described as "genuine Bosch." For that reason the defendants should be released from their undertaking.

The witnesses for the plaintiffs included Mr. J. A. Stevens, representing the British distributors of the plaintiffs' magnetos; Col. W. A. Bristow, consulting electrical engineer; Engineer-Commander W. Briggs, R.N. retired, managing director of De Lavand Holdings Corporation, Ltd.; the Master of Sempill; and Mr. S. Bright, sales manager of J. A. Stevens, Ltd. The gist of their evidence was that the word "Bosch" on a magneto meant an article made only by the plaintiffs. Commander Briggs said that any tampering with or altering of a "Bosch" magneto would make it something else than a "Bosch."

Mr. SHELLEY, for the defence, said that nobody disputed that in this country up to 1914 the word "Bosch" meant the plaintiff firm. After the outbreak of war, magnetos were made in America from imported German parts, and when that supply was exhausted the American Bosch Corporation began business and large numbers of its magnetos were imported into this country on lorries. The result was that from 1915 it was impossible to say that the word "Bosch" distinguished the plaintiffs' goods. He contended that the word applied equally to the American and German Bosch magnetos and he denied that there had been any passing-off by the defendants.

The hearing was concluded on July 1st.

Mr. R. H. COOK, the defendant, said that he signed the agreement in respect of a Siemens converted magneto. He never understood that the agreement was to cover magnetos made by the American or French Bosch companies, whose productions he had always looked upon as, and had called, "Bosch" magnetos. But he had always distinguished between "Robert Bosch" and "Bosch" magnetos.

Giving judgment, His Lordship said there was not sufficient evidence to warrant the conclusion that an American "Bosch" magneto could not be properly described as a "Bosch" magneto without the addition of the word "American." In 1925 the defendants sold a magneto which under no circumstances could be described as a "Bosch" magneto, and following a threat of proceedings Mr. Cook signed an undertaking not to offer for sale, as "Bosch," magnetos not of the plaintiffs' manufacture and would not pass off magnetos not made by the plaintiffs under any description calculated to lead the public to believe that magnetos sold by the defendants were made by the plaintiffs. His Lordship said he held that this undertaking did not mean that the defendants were not entitled to describe an American "Bosch" magneto made after 1918 as of Bosch make, but he did hold that the magneto which they sold under the "trap" order as a "genuine Bosch Z.R.4" could not be so described as it was a reconditioned machine with an armature winding by an unknown hand. This, he said, amounted to an attempt to pass-off a magneto not of the plaintiffs' manufacture as one made by them, and was a breach of part of the undertaking. The plaintiffs were entitled to nominal damages which he estimated at 20s., but they were not entitled to an injunction inasmuch as the defendants were not "threatening and intending" to pass-off. The counterclaim would be dismissed and the costs in each case would be on the county court scale.

British Thomson-Houston Co., Ltd., v. Gower.

IN the Chancery Division on July 4th, Mr. Justice Farwell had before him a motion by the British Thomson-Houston Co., Ltd., against A. Hickson Gower, Shepherd's Bush Green, W., to attach him for disobeying an order of the Court restraining infringement of the plaintiff company's patent relating to incandescent electric lamps.

Mr. TOOKEY, for the company, said that in an affidavit the defendant had sworn that he had never knowingly bought or sold any infringing lamps, and he expressed his regret for what he said was an innocent accident. The plaintiffs desired to investigate the defendant's plea of innocence, and he asked for liberty to cross-examine him. Defendant had applied to the Poor Persons Department for legal aid, which was being considered.

His LORDSHIP directed that the motion should stand over for 14 days to allow the defendant to get his evidence together, with liberty to the plaintiffs to cross-examine him.

Cheap Electric Power Corporation, Ltd.

IN the Chancery Division recently Mr. Justice Bennett dismissed, with costs, a petition for the compulsory liquidation of this company, as the debt to the petitioning creditor had been paid.

Parliamentary News.

[By Our Special Parliamentary Reporter.]

The Overseas Trade Bill.

On July 3rd, in the House of Lords, Lord PONSONBY moved the second reading of the Overseas Trade Bill, which extends the period during which guarantees under the previous Acts may be given and the period within which they may remain in force until March 31st, 1935, and March 31st, 1940, respectively. In the course of his speech Lord Ponsonby mentioned that since October 1st, 1929, contracts to a total amount of £5,118,000 had been issued; of this total over £2,200,000 related to Russian contracts.

Lord BRENTFORD maintained that it was against the principle of the Acts to extent export credits to a Government as had been done in the case of Russia. He thought that as our Russian trade was such a small part of our overseas trade, it would have little effect on unemployment in this country.

Lord PONSONBY pointed out that decisions to grant credits were made by the Advisory Committee, and were arrived at purely from a business point of view. He also informed Lord Brentford that the terms of the Russian contracts were usually from six months to a year.

Private Bills.

Last week in the House of Commons, the Shropshire, Worcestershire, and Staffordshire Electric Power Bill was read a second time; and the Fife Electric Power, the Wednesbury Corporation Electricity Bill, the Sidmouth Electricity Bill, and the Hastings Tramways Co. (Trolley Vehicles) Bill were read a third time.

An Industrial Councils Bill.

The text was published last week of a Bill introduced by Messrs. Mander, Foot, and six other Liberal members with the object of encouraging the formation of industrial Councils and to legalise voluntary agreements when so desired. The Bill provides that the Minister of Labour shall promote the establishment of an industrial council in every industry if it is practicable and expedient. The draft constitution and rules shall be subject to the revision of the Minister, who shall endeavour to secure uniformity of practice. The Minister shall be empowered, on the application of an industrial council, to make an Order giving the effect of law to its decisions, and penalties are provided for the evasion of, or non-compliance with, such an Order. In a schedule to the Bill, the reasons for its introduction are set out in detail. These are mainly to secure that workpeople shall have a voice in the control of their industries, that regular methods of negotiation shall be provided, that technical education and training shall be cared for, and that generally industries shall be advanced by co-operation.

The Torquay and Paignton Traction Bill.

This Bill, which has passed the House of Lords, came before the House of Commons on July 7th, when its rejection was moved by Mr. M'KINLAY on the ground that the Bill deprived the Torquay ratepayers of their option to purchase the tramway undertaking in five years' time. Messrs. LAMBERT and C. WILLIAMS opposed the motion, stating that the measure would enable improvements to be carried out which would provide employment. The Minister of Transport said that the Bill had been certified because it was calculated to give a certain amount of employment, but he regretted that it had been allowed to go through its second reading without opposition.

The motion for the rejection of the Bill was carried.

Correspondence.

Correspondents should forward their communications **as early as possible.** *No letter can be published unless we have the writer's name and address in our possession.*

Electrical Development: A Proposal.

Mr. Keats, in your current issue, does not deal fairly with Mr. Ben Quarmby's article on "Electrical Development: A Proposal" in a previous issue. Many of the houses shown in the aerial photo have chimneys, and Mr. Keats does not say how many have not, neither does he state the charge for energy. Mr. Quarmby asked for a ½d. per kWh rate through one meter, and stipulated that the houses should be all-electric, whereas Mr. Keats's houses burn coke, and are therefore not all-electric.

Presumably these houses have two meters, the claim of economy by the adoption of Mr. Quarmby's one-meter one-rate principle being overlooked by Mr. Keats.

I may express myself in favour of Mr. Quarmby's ideal rather than Mr. Keats's scheme.

"All-Electric."

July 4th, 1930.

[Although Mr. Keats admits that the houses on the Woolwich estate are not all-electric in that each is equipped with a slow-combustion stove, we think it is clear that only one meter is employed for each house.—EDS. ELEC. REV.]

If Mr. G. W. Keats had followed the principles advocated by Mr. B. Quarmby in the development of his Woolwich estate, he would have been able to economize, and his dogmatic statement that "*no further reduction can be made*" would not then be applicable; there is no hope for the future in such a statement.

C. A. Brown.

Bolton, *July 7th*, 1930.

The Shannon Scheme.

I did not see Mr. Robert N. Tweedy's letter, which appeared in the ELECTRICAL REVIEW of June 20th, until a few days ago. This explanation will, I trust, convey to him the fact that there was no intentional discourtesy in the delay in replying.

In the first place, your correspondent has got all his sections out of alignment with the statements made in my letter. I did not state that the construction costs were three times greater than the original estimate. The same applies to the selling price to the consumer. I said "since the inception of the scheme the construction costs have multiplied themselves three-fold, and the cost to the consumer of the unit at his terminals has done even more."

I did not know there was such a thing as "the original estimate" to which your correspondent refers. This will, naturally, be within the knowledge of such a diligent and earnest student of electro-economics, and he will have no difficulty in pointing out where it can be obtained. An original estimate of an engineering undertaking is that estimate which is arrived at by an independent consulting engineer who has prepared the scheme to rigid specifications with fully-detailed sets of drawings, and has based his calculations on these and placed them on record in his report for the information and action of his clients, who go out to the open market and invite tenders on these specifications from all responsible engineering firms. In my ignorance I did not know that this had been done, and am prepared to stand rebuked. Or, possibly, there is a mistake somewhere. When this has been adjusted it will be time enough to take up the matter again. This disposes of sections (*a*) and (*b*).

In section (*c*) I did not say that "the Northern Government wishes to compete with the Free State in the supply of electricity." How could it? Neither Government has powers to encroach beyond its own area. They are not competitors canvassing for business on common ground. The line of argument and statement runs thus: "Can coal beat water? Can the coal-driven station at Belfast beat the water-driven station at Limerick?" On these premises can the Northern Government (working, of course, within its own area, since it is as impossible for it to get across the world-renowned Border as it is for the Free State to skip across it from its side) "enter into competition as a supplier of electrical energy with the Free State and beat it on results?"

Nothing more need be said, I think, but if there is still a difficulty I will try it all over again.

It may be necessary to refer to the fog which has shrouded the Shannon and its works. In places it may be possible to pierce it; but the veil of impenetrable secrecy has descended on many vital matters which would be of peculiar interest to the earnest student of electro-economics.

P. T. W.

July 4th, 1930.

[This letter has been abbreviated.—EDS. ELEC. REV.]

Published Specifications.

Compiled expressly for this journal by a firm of Chartered Patent Agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings taken.

1928.

35,996. "Insulating oil for electro-technical purposes." Siemens-Schuckertwerke Akt. Ges. December 7th, 1927. (301,876.)

36,377. "Electric measuring instruments for use as contact makers." International General Electric Co., Inc. December 9th, 1927. (302,165.)

36,456-7. "Electric circuit breakers." W. B. Whitney, E. B. Wedmore, and British Electrical and Allied Industries Research Association. December 10th, 1928. (330,615-6.)

1929.

684. "Producing thin insulating layers on wires." Siemens-Schuckertwerke Akt. Ges. January 16th, 1928. (304,192.)

690. "Producing thin insulating coatings on wires." Siemens-Schuckertwerke Akt. Ges. February 16th, 1928. (Addition to 304,192.) (306,122.)

716. "Electric furnace." C. E. Cornelius. January 9th, 1928. (303,798.)

1,071. "Process and apparatus for influencing electric currents by means of light rays." A. Joffe. January 14th, 1928. (304,132.)

1,183. "Rotors for dynamo-electric machines." British Thomson-Houston Co., Ltd. January 13th, 1928. (303,906.)

3,691. "Alternating-current rectifier circuits employing imperfect valves." C. S. Weyandt. July 5th, 1928. (314,939.)

3,693. "Electric motors." C. S. Weyandt. July 18th, 1928 (315,783.)

3,877. "Controlling devices for wireless receiving apparatus." B. Hesketh. February 5th, 1929. (330,551.)

4,170. "Electric furnaces." L. D. J. Tisseyre. February 8th, 1928. (305,631.)

4,371. "Automatic electric switches." J. A. Higgins. February 9th, 1929. (330,506.)

4,444. "Insulation of electric wires and cables." British Insulated Cables, Ltd., and F. J. Brislee. February 9th, 1929. (Cognate application, 7,733/29.) (330,552.)

4,683. "Junction boxes and the like for electrical installations." E. P. S. Cattle. December 12th, 1929. (330,654.)

6,755. "Automatic regulating, controlling, and switching means for electrical installations." J. Stone & Co., Ltd., and A. E. Honey. March 1st, 1929. (Cognate application, 32,838/29.) (330,510.)

6,977. "High-frequency amplifier circuits." British Thomson-Houston Co., Ltd. March 2nd, 1928. (307,295.)

7,361. "Safety device for electrically-heated water vessels." H. J. Dowsing, F. M. Steele, C. W. Slark, and A. L. Melsom. March 6th, 1929. (330,558.)

7,426. "Electrical energy translating systems." Electrical Research Products, Inc. May 26th, 1928. (312,338.)

7,492. "Control systems for direct-current reversible electric motors." E. H. M. Langley and Associated Electrical Industries, Ltd. March 7th, 1929. (330,528.)

7,547. "Thermionic valves." Dr. B. Loewe. March 7th, 1928. (308,623.)

7,575. "Electric test torch or lamp." S. B. Hamilton. March 8th, 1929. (Cognate application, 19,321/29.) (330,564.)

7,602. "Fine-adjustment controls for variable condensers and like adjustable instruments of wireless apparatus." Plessey Co., Ltd., and W. O. Heyne. March 8th, 1929. (330,533.)

7,626. "Systems of electric motor control." International General Electric Co., Inc. March 8th, 1928. (307,470.)

7,627. "Electric regulating systems employing vibratory regulators." British Thomson-Houston Co., Ltd., and R. D. Parry. March 8th, 1929. (330,534.)

7,674. "Electrical filters or networks, loaded cables, and the like." Automatic Telephone Manufacturing Co., Ltd., and T. H. Turney. March 8th, 1929. (330,586.)

7,675. "Impulse repeaters for use in telephone or like systems." Automatic Telephone Manufacturing Co., Ltd., and T. H. Turney. March 8th, 1929. (330,540.)

7,693. "Electric welding." Electrical Research Products, Inc. March 16th, 1928. (307,923.)

7,694. "Electrical telegraph and like signalling systems." Electrical Research Products, Inc. June 2nd, 1928. (Addition to 312,338.) (312,904.)

7,695. "Voltage discriminating systems." Electrical Research Products, Inc. March 31st, 1928. (308,789.)

7,729. "Attachment of the coupling elements to a joint carrier in multiple thermionic valves." Dr. S. Loewe. March 9th, 1928. (307,507.)

7,746. "Electric switches." British Thomson-Houston Co., Ltd. March 10th, 1928. (307,510.)

7,780. "Electric supervisory arrangements for remote-control systems." Siemens & Halske Akt. Ges. March 10th, 1928. (307,515.)

7,792. "Telephone instruments and like electro-magnetic devices." Celestion, Ltd., and C. French. March 9th, 1929. (330,547.)

7,800. "Insulated cooling systems for electrodes." F. S. Smith. March 11th, 1929. (330,622.)

7,906. "Electric hair brush." J. Hallett. March 11th, 1929. (330,573.)

7,909. "Processes of, and devices for, electrically exploring the ground by means of alternating currents of very low frequency." R. Ambronn. March 20th, 1928. (308,256.)

7,912. "Electric door-operating devices." Elevator Supplies Co., Inc., and H. W. Shonnard. March 11th, 1929. (330,588.)

7,968. "Telephone transmission systems." Standard Telephones and Cables, Ltd., and K. E. Latimer. March 11th, 1929. (330,589.)

8,082. "Means for switching current-consuming units from one main voltage to another." W. Kunze, H. Fischer, and Radiofrequenz Ges. January 7th, 1929. (330,603.)

8,150. "Electric cooking apparatus." Falkirk Iron Co., Ltd., H. J. Kennard, A. Kinnes, and J. H. Erskine. March 13th, 1929. (330,604.)

8,153. "Control system for electric motors." C. Michahelles. March 13th, 1928. (307,803.)

8,180. "Electric protective arrangements." A. Reyrolle & Co., Ltd., and R. W. Biles. March 13th, 1929. (330,606.)

8,201. "Electric relays." International General Electric Co., Inc. March 13th, 1928. (307,806.)

8,209. "Grid electrodes of vacuum electric tube devices." E. Y. Robinson and Associated Electrical Industries, Ltd. March 13th, 1929. (330,610.)

8,238. "Telephone systems." Standard Telephones and Cables, Ltd., and L. B. Haigh. March 13th, 1929. (330,626.)

8,463. "Electric switches." General Electric Co., Ltd., and A. E. Angold. March 15th, 1929. (330,636.)

8,518. "Electrolytic deposition of metal on metal tubes." J. Stone & Co., Ltd., W. Lambert, and R. W. Wild. March 15th, 1929. (330,639.)

8,582. "Electric signalling systems." Western Electric Co., Ltd. (Bell Telephone Laboratories, Inc.). March 16th, 1929. (330,642.)

8,836. "Protective arrangements for sectionalised electric power circuits." A. Reyrolle & Co., Ltd., and H. C. Atkins. March 19th, 1929. (330,658.)

8,971. "Electrical resistances." E. Jones. March 20th, 1929. (330,664.)

9,131. "Method of, and apparatus for, the production of uni-directional high voltages from alternating current." R. E. Schnorf. March 21st, 1929. (330,667.)

9,195-6. "Acoustic devices." Marconi's Wireless Telegraph Co., Ltd. March 21st, 1928. (308,317-8.)

9,351. "Electric circuit-making and breaking devices." British Thomson-Houston Co., Ltd. March 23rd, 1928. (308,612.)

9,548. "Projector lamps and the like." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. April 27th, 1928. (310,514.)

9,718. "Vacuum-electric tube devices." E. Y. Robinson and Associated Electrical Industries, Ltd. March 26th, 1929. (Addition to 222,176.) (330,675.)

9,741. "Vacuum switches." Siemens-Schuckertwerke Akt. Ges. April 11th, 1928. (309,489.)

9,955. "Junction boxes and the like." C. E. Gee. March 28th, 1929. (330,676.)

10,061. "Metallically coating electrically non-conducting bases." M. Ow.-Eschingen. March 28th, 1929. (330,677.)

10,349. "Electrically-heated utensils." N. Dennes and Associated Electrical Industries, Ltd. April 3rd, 1929. (330,680.)

10,614. "Electric batteries." Burgess Battery Co. May 28th, 1928. (312,605.)

10,928. "Method of duplex signalling by means of carrier waves." K. W. Wagner. April 19th, 1928. (309,999.)

11,128. "Light electric cells." F. Rother. May 14th, 1928. (311,701.)

11,664. "Sparking plugs." V. Gionne. April 15th, 1929. (330,691.)

12,088. "Electrical frequency changers." British Thomson-Houston Co., Ltd. April 18th, 1928. (309,959.)

12,104. "Electric accumulators." W. Haddon and W. Haddon. April 18th, 1929. (330,698.)

12,629. "Flux-coated electrodes for electric welding" J. Mehl. April 23rd, 1928. (310,341.)

12,770. "Junction boxes for electric wiring systems." S. J. Bryce, W. R. Clements, H. Leicester, A. E. Watson, and J. H. Roberts. April 24th, 1929. (330,703.)

12,972. "Transformers for feeding mercury-vapour rectifiers." Akt. Ges. Brown, Boveri et Cie. April 30th, 1928. (310,801.)

13,528. "Fluid-operated brakes for tramway and other vehicles." Electro-Mechanical Brake Co., Ltd., G. N. Cadbury, and S. Smith. May 1st, 1929. (330,709.)

13,529. "Propagation of wireless waves." R. C. Galletti and Ferranti, Ltd. May 1st, 1929 (330,710.)

14,305. "Electric lamps." A. E. Moore and H. B. Wilkinson. May 8th, 1929. (330,718.)

14,388. "Electric transformers." E. Fries and Hackbridge Electric Construction Co., Ltd. May 8th, 1929. (330,720.)

14,912. "Electric timepieces, clocks, and alarms with pendula or escapement mechanism." L. D. J. Tisseyre and I. Cotnareanu. May 13th, 1929. (330,726.)

15,401. "Electric telephone cables." Felten & Guilleaume Fabrik Elektrischer Kabel, Stahl-und Kupferwerke Akt. Ges. April 19th, 1929. (330,731.)

15,851. "Connector for electric conductors." British Insulated Cables, Ltd., and C. Fletcher. May 22nd, 1929. (330,742.)

16,288. "Arrangement for influencing the radiation of electric waves." C. Lorenz Akt. Ges. October 20th, 1928. (330,750.)

17,372. "Means for controlling electric motors." Clarke, Chapman and Co., Ltd., and A. Read. June 6th, 1929. (330,762.)

18,384. "Circuit arrangements for generating high-frequency oscillations." S. G. S. Dicker (Naamlooze Vennootschap Philips' Gloeilampenfabrieken). June 14th, 1929. (330,769.)

19,154. "Glow discharge lamps for television apparatus." Telephon Akt. Ges. August 21st, 1928. (317,754.)

19,816. "Electrical propulsion of ships." G. A. Juhlin and Associated Electrical Industries, Ltd. June 27th, 1929. (330,787.)

19,819. "Artificial lighting." M. Montessori. June 27th, 1929. (330,788.)

19,966. "Asynchronous motors." Naamlooze Vennootschap Hengelosche Electrische en Mechanische Apparaten-Fabriek and H. A. W. Klinkhamer. October 10th, 1928. (Addition to 294,563 and 307,329.) (330,790.)

20,369. "Time switches." Landis & Gyr Soc. Anon. July 12th, 1928. (315,358.)

20,709. "Luminous electric discharge tubes." General Electric Co., Ltd. August 1st, 1928. (316,611.)

20,966. "Electric switches." A. Rudman and Associated Electrical Industries, Ltd. July 8th, 1929. (330,798.)

21,631. "Aerial electric cables." Felten & Guilleaume Carlswerk Akt. Ges. September 26th, 1928. (319,683.)

23,184. "Polyphase asynchronous motors." Siemens-Schuckertwerke Akt. Ges. July 28th, 1928. (Addition to 299,886.) (316,326.)

23,567. "Induction controllers and like controlling apparatus." Electrical Apparatus Co., Ltd., and R. H. Barbour. July 31st, 1929. (330,819.)

24,148. "High-tension cables." British Thomson-Houston Co., Ltd. August 8th, 1928. (317,013.)

24,926. "Electric discharge lamps." Patent-Treuhand-Ges. für Elektrische Gluhlampen. August 25th, 1928. (317,851.)

24,960. "Electric welding machines." F. P. McBerty. August 15th, 1929. (330,828.)

26,143. "Sparking plug." C. T. Straub. August 28th, 1929. (330,833.)

27,656. "Electrically-driven centrifugal apparatus." Soc. Anon. Constructions Electriques Paray. May 4th, 1929. (Addition to 270,723.) (330,836.)

30,012. "Rheostats and the like." L. F. A. Fogarty and Zenith Electric Co., Ltd. October 3rd, 1929. (330,851.)

31,913. "Protective devices for induction motors." British Thomson-Houston Co., Ltd. October 23rd, 1928. (330,859.)

31,919. "Arrangement for starting mechanically co-operating electric motors connected to a common generator." Allmänna Svenska Elektriska Aktiebolaget. October 27th, 1928. (330,860.)

32,305. "Arrangement for converting direct current into alternating current by means of electric vacuum valves." Maschinenfabrik Oerlikon. November 9th, 1928. (330,861.)

32,691. "Speed regulation of electrically-driven machines, more especially adapted for paper-making machines." Allmänna Svenska Elektriska Aktiebolaget. October 31st, 1928. (330,863.)

35,043. "Electrical transformer device for internal-combustion engines." Espe-Werke Ges. November 17th, 1928. (330,868.)

Marine Power Stations.

In a letter to *The Times*, Mr. A. C. Hardy writes that in completing the *Britannic* the White Star Line has virtually begun a new era in propulsion for British Transatlantic liners. He points out that by building an electric ship, whether turbo- or Diesel-electric, it would be still further getting away from stereotyped marine engineering practice, and that the change from coal to oil fuel and from steam to electric drive are bringing about a change in the centre of gravity of our marine engineering business.

A turbo-electric ship of 180,000 shaft horse power, such as might conceivably be required for fast Transatlantic service, would have as its main machinery contractor an electrical company; the only part played by marine engineers *qua* marine engineers in such a ship would be for pumps and for boilers. A Diesel-electric ship of this power would be probably the most epoch-making step in marine engineering that has ever been taken, and it is generally understood that designs for such a ship have been prepared. A very rough estimate shows that a vessel of this type would carry on her round trip between Southampton and New York some 9,000 tons of fuel less than a corresponding oil-burning turbo-electric ship. Considerations of weight and space for fuel carried might conceivably, therefore, persuade such progressive owners as the White Star Line to adopt this type of propulsion, which would be as different from that of existing ships as existing ships are from the vessels of 50 years ago.

New Work for Contractors.

Particulars of new works and building schemes for the use of electrical installation contractors in search of work and all interested in the sale of electrical and allied plant and other products.

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

AYRSHIRE.—Housing scheme (120) for the C.C.; clerk, Ayr.

BANBURY.—Senior and infants' schools; borough architect.

BATH.—School, Weston, for Somerset E.C.; director of education, Weston-super-Mare.

BIRKENHEAD.—Houses (330) for the T.C.; borough surveyor. Houses (228), Bebington estate (£92,926); Corporation Works Department. Central library, technical college and school, Borough Road site; borough engineer.

BIRMINGHAM.—Art gallery, Cannon Hill Park; Maddocks and Walford. Houses (600), Ward End estate; P. W. Cox. Houses (200), Acocks Green; Jones & Spencer. Junior school, Woodhouse Road (£14,000) and elementary school, Highters Heath (£25,000); Education Committee.

BOLTON.—Central market premises for the Markets Committee (£110,000); borough surveyor. (Contractors, W. Townson & Sons, Bolton.)

BOSTON.—Houses (118) with electric lighting, Fenside Road, for the T.C.; borough surveyor.

BRADFORD.—Extensions to College of Arts and Crafts; F. Robinson & Sons, builders, Bradford.

BRAMHALL (STOCKPORT).—Bank, for Martin's Bank.

BREDBURY.—Housing scheme (52), Harrytown estate; clerk to Bredbury and Romiley U.D.C.

BRIDLINGTON.—Municipal offices for the T.C. (£42,000); borough surveyor.

BROWNHILLS.—Houses (250) for the U.D.C.; borough surveyor.

BUCKS.—Schools, Holmer Green, Aylesbury, Slough, and Bradenham, for the E.C.; director of education, Aylesbury.

CHELMSFORD.—Houses (60), Barns estate; Pryke & Son. Extensions, printing works, Golday Gardens; Mercury Press. Three schools for the borough E.C. (£52,500); director of education.

CHESTER-LE-STREET.—Additional houses (200), Birtley, for the R.D.C.; surveyor.

CONISBOROUGH (YORKS.).—Houses (40) for the U.D.C.; surveyor.

DAGENHAM.—Two schools, Easthrook End Road (£45,800); Vicarage Road (£23,500); county architect.

DARLINGTON.—Public abattoir for the T.C. (£11,500); borough surveyor.

DUDLEY.—Main shopping centre, Priory housing estate, for the T.C.; borough engineer.

ECCLES.—Schools, Winton and Barton (1,600 places) for the borough E.C.; A. V. Ridgway, clerk. Houses, shops, and covered market for the T.C.; borough surveyor.

ERITH.—Town hall (£101,000) and public baths (£32,500) for the U.D.C.; surveyor.

GRANTHAM.—Housing scheme (52) for the T.C.; P. A. Benn, borough surveyor (£2 2s.).

HIGH WYCOMBE.—Extensions, War Memorial Hospital; T. Thurlow, architect, High Street (returnable deposit of £2 2s.).

IRISH FREE STATE (BRAY, Co. WICKLOW).—Construction of boys' national school at Vevay Road; W. H. Byrne and Son, architects, Dublin (£3 3s.).

KENT.—Extensions, county school for boys, Bromley, for Kent E.C. (£55,000); director of education, Maidstone.

KINGSTON-ON-THAMES.—Public baths for the T.C. (£60,000); V. Bain & Allan Johnson, Leeds. Houses (140) for the T.C.; borough surveyor.

LANCASTER.—Isolation hospital (£60,000); Corporations of Lancaster and Morecambe, and Carnforth U.D.C.

LEEDS.—Houses (100), Meanwood estate and Middleton estate; city architect. Houses (142) and flats (64), York and Selby estates (£65,130); W. Thompson & Sons. Extensions, Meanwood Colony (£51,100); Ripley and Sons. Flats (310), Dolly Lane; National Housing Society. Shops (50), Oakwood Lane; Iax Bros. Houses (144), flats (64), on the York and Selby Road estate; city engineer.

LIVERPOOL.—Cinema, Green Lane and West Derby Road, Tulbrook (£40,000); A. E. Shennan, architect.

LONDON (EAST HAM, E.).—Housing scheme (126) for the T.C.; A. T. Bridgewater, borough engineer (£2 2s.).

(LEYTON, E.).—Technical college; county architect. Public wash-houses for the T.C. (£10,000); borough engineer. Extensions, Hood central schools, for the borough E.C. (£13,000); education architect.

(HIGHGATE, N.).—Hospital extensions (£20,500); L.C.C. architect.

(CAMBERWELL, S.E.).—Offices for L.G.O.C., Camberwell Road; S. A. Heaps, architect.

(SOUTHWARK, S.E.).—Flats (200), Dodington Grove; borough engineer.

(WANDSWORTH, S.W.).—Cinema, York Road; W. R. Glen, architect.

(WESTMINSTER, S.W.).—Reconstruction Palais cinema, Great Windmill Street; Windmill Theatre.

LUTON.—Extensions, Adamant Engineering Co., Dallow Road. Houses (24), Connaught Road, for H. C. Janes, Ltd.

MALTBY.—Houses (134); U.D.C. surveyor.

MANCHESTER.—Bank premises, corner of Ashton New Road and Grey Mare Lane; T. A. Fitton & Son, architects; William Thorpe & Sons, Chester Road, Cornbrook, contractors. Extensions for Metro-Vick Electrical Co., Trafford Park; plans by H. S. Fairhurst, architect, 55, Brown Street; J. Gerrard & Son, Swinton, contractors.

MARGATE.—Two schools for the borough E.C. (£30,000); clerk.

MIDDLESEX (SOUTH MIMMS).—Secondary school for Middlesex E.C.

MITCHAM.—Baths (£38,000); U.D.C. surveyor.

MORECAMBE.—Municipal offices, Calton estate; borough engineer.

NORTHANTS.—School (600 places), Weston Favell, for the E.C.; John Brown, architect, 83, St. Giles' Street (£2 2s.).

OLDHAM.—Extensions, Municipal hospital; Taylor, Roberts and Bowman, architects.

PURLEY.—Ice skating rink, restaurant, shops, &c.; James Smith & Sons, South Norwood.

RETFORD.—Senior schools for E.C. (£40,000); borough architect.

ROCHDALE.—Alterations, Hippodrome Theatre; plans, Butterworth & Duncan, 2, Baillie Street; T. Wilkinson and Sons, contractors, Walpole Street.

ST. ANDREWS.—Picture house, North Street; Gillespie and Scott, architect.

SHEFFIELD.—Radium treatment buildings at Royal Infirmary; governors. Houses (77), Wisewood estate; W. Memmory, Swallownest.

SLEAFORD.—Houses (52) for the R.D.C.; surveyor.

STAFFORDSHIRE.—Infants' school for E.C. in Elm Street, Willenhall (£10,000); borough architect.

STANWAY.—Poor law institution for Essex Public Assistance Committee (£170,300); J. Stuart, county architect. Chelmsford.

STIRLINGSHIRE.—Schools and extensions for the E.C (£250,000); director of education, Stirling.

THORNE (DONCASTER).—Additional houses (100) for Pease and Partners, Darlington.

TORQUAY.—Houses (188), council estate (£74,825); Unity Builders (Paignton).

ULVERSTON.—Secondary school; Baxendale Bros., builders, Chorley.

WADDON.—Film and acetate stores, Waddon Mills; J. T. R. Wildman, 189, Regent Street, W.

WATFORD.—Cinema site; Kempster & Williams.

WOOTTON.—Senior school (420 places) for Beds. E.C.; director of education, Bedford.

WORKINGTON.—School for the borough E.C. (£25,000); W. C. Ralph & Son, architects, 31a, King Street, Wigan.

YORK.—Houses (200), Middlethorpe Lodge estate; Thomas Place, Sowber Gate, Northallerton.